Sovereign bond market and financial globalization

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FORMAT DE PRÉSENTATION

1) PRÉSENTATION DES DONNÉES ET RÉSULTATS STATISTIQUES

Pour faciliter la lecture, les données et résultats statistiques seront présentés selon les normes anglo-saxonnes (par exemple : 3,045.95 au lieu de 3 045,95).

2) EXPRESSIONS LATINES ET ABRÉVIATIONS

Dans le souci d'alléger la discussion de notre étude, les abréviations latines « *i.e.* » (*ita est*), « *e.g.,* » (*exempli gratia*) et « *cf.* » (*confer*) seront utilisées respectivement pour « c'est-à-dire », « par exemple » et « voir » et seront indiquées en italique. On notera également *ceteris paribus* (*ceteris paribus sic standibus*) pour « toutes choses égales par ailleurs », *de facto* pour « de fait » et *via* pour « par le truchement de ».

3) RÉFÉRENCEMENT

La numérotation des équations, annexes, figures et tableaux est réinitialisée au début de chaque chapitre. Leur référence fait figurer le numéro du chapitre puis le numéro de l'élément considéré (*e.g.*, l'équation n°15 du Chapitre 4 est référencée 4.15).

TABLE DES ACRONYMES

BP *Basis Point*

Bund *German Government Bond*

DM *Developed Market (Country)*

EURIBOR *Euro interbank offered rate*

EM *Emerging Market (Country)*

FC Yield *Foreign Currency Yield*

FRA *Forward rate agreement*

JGB *Japanese Government Bonds*

LC Yield *Local Currency Yield*

LIBOR *London interbank offered rate*

MT *Maturity*

Treasuries *US Treaury Debt*

ZC *Zero Coupon*

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GENERAL INTRODUCTION

I. Introduction

The objective set for this PhD thesis is to explore the link between sovereign risk and financial sector stability. At the outset of the research process, main themes included financial contagion between developed and emerging countries, contagion between the sovereign and banking sectors across countries, and the link between bank and sovereign ratings. To date, empirical articles in these fields investigate predominately the determinants and interactions of asset prices, multilateral exposures of banks in different countries, or behavior of portfolio flows around crisis episodes. As far as research on sovereign debt is concerned, the bulk of empirical articles is dedicated to fundamental determinants of CDS prices or sovereign credit spreads, for instance Longstaff et al. (2011), Aizenman, Hutchison, and Jinjarak (2011), and Gelos, Sahay, and Sandleris (2011), or sovereign debt default and restructuring, e.g. Kruger (2003), Aguiar and Gopinath (2006). However, the structure and dynamics of investor holdings of government debt has remained broadly unexplored. To fill in this gap in the research literature I constructed a new database of holdings of government debt by foreign and domestic investors for a broad and representative set of developed and emerging economies. In the first article I use the dataset to determine the drivers of changes in bond holdings through the prism of fundamentals, yields and risk aversion. In the second article I investigate whether changes in ratings are associated with changes in bond holdings, specifically whether rating downgrades qualify as a trigger for debt selloff.

The composition and dynamics of the investor base deserves attention for at least four reasons. First, investor demand for government debt most likely determines the financing cost for the government on the primary market, hence measuring and understanding the evolution of the investor demand can help steer the issuance policy in the long term. Second, monitoring the investor base is crucial in terms of risk management and financial stability, as investor base composed of potential yield seekers pumping “hot money” can potentially increase the possibility of capital outflows and surging bond yields which would weaken country’s refinancing capacity. Third, stability of the domestic financial system depends on the exposure of domestic institutional investors, in particular banks and insurers, to government

debt at home and abroad. Fourth, the share of foreign private and foreign official investors may determine the country's decision whether to default.

The initial scope of the PhD was centered on emerging economies located in Latin America, Eastern Europe and Asia. As the banking and sovereign crisis between 2007 and 2011 concerned mainly the developed economies, I have extended the scope to Eurozone economies and several relevant developed economies. As a result, this PhD thesis provides a complete picture of the globalization of sovereign debt markets.

Throughout the second half of XXth century numerous developing economies have experienced painful banking, currency and sovereign crisis. In certain cases these crisis occurred in form of twined or triple crisis, as outlined by Kaminsky and Reinhart (1999). Typically the source of these crises lied in the combination of foreign currency borrowing with unstable banking sector, opening of the financial account and high external vulnerability. Having learned a painful lesson in the past, several emerging economies have successfully overhauled their institutions and set monetary and fiscal policy into the path of stability and, as a result, they are currently undergoing an important and wide-spread process of developing local currency markets. Following this lead, I identified two research themes that have been relatively unexplored and deserve particular attention. First theme investigates the impact of political risk, inflation and macroeconomic fundamentals on government bond yields denominated in local currencies compare to bonds issued in foreign currencies, as described in Article 3. Second theme concentrates on the macroeconomic development of local currency bond markets and foreign participation, as outlined in Article 4.

II. History of government debt and financial globalization

Direct lending by banks was the key source of funding for sovereigns in the past and historical evidence shows that this form of sovereign lending was common already in medieval times. Based on over 400 lending contracts from late sixteenth century Drelichman and Voth (2011) demonstrate that King Philip II of Spain who was at war for most of his reign defaulted four times, yet he never lost access to capital markets and could borrow again within a year or two of each default. Interestingly, upon each default the Genoese bankers who provided the majority of funding showed solidarity and high cohesiveness by forming into lending groups and determining the terms of new loan contracts.

Starting from late seventeenth century sovereign lending started to evolve towards issuance of tradable government bonds with Bank of England being among the first sovereign issuers. Flandreau (2013) shows evidence that already in the first half of XIX century international bond markets in England were active and prosperous. Moreover, during this time the bondholder committees at the London Stock Exchange set up a system of Collective Action Clauses to protect their interests and attract new investors. In their book on history of international lending Mauro, Sussman, and Yafeh (2006) examine data on sovereign bonds issued by borrowing developing countries between 1870 and 1913 when the trade and issuance of international bonds was at its peak, maturities of developing countries exceeded 20 years and Russia succeeded in placing a bond with 80 year maturity. Investor were so confident about the functioning framework that they even accepted bonds with redemption clauses and countries' future export or tax revenues were used as collateral to enhance the credit quality. The reason why such conditions were accepted goes back to the development of the Corporation of Foreign Bondholders that helped bondholders cooperate in case of distress. Finally, authors demonstrate that global crises or contagion are a feature of the 1990s which was hardly known in the previous era of globalization. Authors refer to Goetzmann (2001) who showed that cross-country co-movement of equity markets increased in the 1990s and, in consequence, investors willing to diversify had to enlarge the range of countries.

The First and Second World Wars brought a wave of default in advanced and emerging countries and for several decades international investors focused on bonds of key developed countries, while emerging economies relied on direct lending from banks. It continued until the debt crisis in 1982 when a number of countries in Latin America, confronted with high interest rates and low commodities prices, admitted their insolvency towards international commercial banks. Over the next decade several of those countries attempted to restructure and reschedule debt, but eventually the only viable solution came with the 1988 Brady plan that assumed debt relief and, most importantly, a switch from loans to tradable bonds.

It is widely considered that from this moment governments were incentivized to issue bonds rather than loans and financial globalization of emerging economies completed the process. Graph 1 shows that between 1988 and 1995 the level of weighted-average financial openness of emerging economies, as measured by Chinn and Ito (2008), almost doubled going from 23% do almost 40%. As developing economies experienced high growth in the 1990s onwards, it turned out that gradual macroeconomic stabilization was not coupled with rising levels of public debt as it was in the developed economies, as indicated in Graph 3. This effect

is believed to be related to the global imbalances between savings and investment, in particular in the capital being channeled from emerging economies seeking to allocate rising FX reserves to developed economies that offer bonds considered as safe assets, as explained in Bernanke (2005) and Caballero and Krishnamurthy (2009) among others. In a nutshell, the last two centuries converted emerging economies from capital importers into capital exporters and the central banks and sovereign wealth funds of emerging economies have become an integral part of demand for developed market bonds.

Finally, recent developments of local currency bond markets in emerging economies have become a new important aspect of the financial globalization. As numerous developing economies achieved macroeconomic stability and reduced external vulnerabilities while maintain high rates of economic growth, national treasuries seized the opportunity to issue sovereign debt in local currencies. As the yields on local currency debt remained considerably higher than in advanced economies, foreign investors from advanced economies began to invest in the bonds of emerging countries, which in a sense completed the investment-issuance loop between these two groups. Still, important differences accompanied this process, as illustrated in Graphs 4 and 5. First, it is a well-known fact that emerging economies have greater savings than investment while advanced economies are characterized by lower investment than savings ratios. Second, while the government debt increased in line with savings and investment in emerging economies, from 2004 onwards growth of indebtedness in developed markets completely outpaced the savings and investment.

III. The link between sovereign debt and financial institutions as the key element for the global financial stability

Both empirical and theoretical literature on sovereign debt tends to classify bondholders into two categories: domestic and foreign investors. Yet, among investors dealing with government bonds we may find central banks, sovereign wealth funds, commercial banks, mutual funds, insurance companies, pension funds and even non-financial companies and households.

The Eurozone crisis has shown that the link between governments and banks is fundamental not only for financial stability of one country, but for the stability of the region. Acharya, Drechsler, and Schnabl (2012) demonstrate that this link is particularly dangerous in constellation with sovereigns acting as lenders of last instance on one side, banks moving close to illiquidity and banks holdings government bonds of deteriorating quality. As a result,

in absence of resolution mechanisms investors tend to panic and sovereign and credit spreads surge. Acharya and Steffen (2013) demonstrate that, in the second case, banks that are in financial difficulties are likely to "gamble on resurrection" by investing in risky government bonds which often makes their situation even more miserable in the end. Finally, empirical results by Arslanalp and Takahiro (2012) also show that foreign banks and other private foreign investors are very likely to sell bonds under stress.

IV. Summary of research articles and research contribution

In this section I briefly summarize the motivation, empirical methodology, analytical results and conclusions of the four articles.

IV.1. Article 1: Drivers of foreign and domestic demand for sovereign bonds in developed and emerging economies: fundamentals vs. market sentiment

The objective of this paper is to introduce the bondholding dataset, gain a broader perspective of the global demand for government debt and explain the dynamics of investor behaviour through the prism of observable macroeconomic and fiscal factors, bond yields, influence of rating agencies and market sentiment. To analyse the differences in demand drivers I introduce a new dataset on government bond holdings in 28 emerging and developed economies based on national sources. Within each country I am able to track between 3 and 20 years of history and distinguish between private and official non-resident holders and different categories of domestic banks, investment funds, pension funds and insurance companies and domestic central banks.

In terms of methodology I apply panel specification similar to Mehl and Reynaud (2010) and Emanuele Baldacci and Kumar (2010) to analyse the macroeconomic, fiscal and market determinants of holdings of different investor groups. The novelty of my approach compared to previous studies lies in using the change in bondholdings by specific investor as dependent variable and employing macroeconomic, fiscal, institutional and market-related indicators as explanatory variables. For each of the five investor groups (private non-residents, official non-residents, domestic banks, domestic pension and insurance funds, domestic for investment funds) I regressions by temporal subsamples, one for the entire time period 2001 to 2012, one for the pre-crisis period 2001 to 2007 and one for crisis period 2007 to 2012. I apply either pooled estimation for the full sample and country groups while controlling for

cross-section dependence, heteroskedasticity and serial correlation using the Driscoll and Kraay (1998) method.

The key findings are the following. While the global amount of outstanding government debt more than tripled between 2001 and 2011, the share of foreign holdings across countries increased from 20% to 28% indicating that rising indebtedness might be coupled with spreading financial globalization. Interestingly, foreign central banks have been stocking government debt at a greater pace than international private investors and at the end of 2011 central banks' holdings were only slightly below private stocks. Investor structure varies strongly across countries. While foreign investors hold between 40% and 90% of government debt issued by Eurozone countries with Germany, France and Netherlands being most exposed to external demand, 90% of Japanese and 70% of US, UK and Danish debt is held domestically. Finally, the share of foreign investors holding emerging market debt has been consistently rising over the last ten years reaching record levels in May 2013.

Econometric findings indicate that prior to the crisis that international private investors, banks and investment funds were return seekers purchasing government bonds when bond prices increase. Not surprisingly, risk perception by international investors evolved over time. Prior to the crisis private international investors tend were purchasing debt of countries with higher growth, rising public indebtedness and higher yields. From 2007 onwards international private flows were directed to countries with lower yield levels and, perhaps more importantly, private inflows are significantly related to falling sovereign yields in some countries while outflows are associated with increasing yields in others. In turn, foreign central banks purchase bonds at low yields and better credit ratings, and sell under rising spreads or rating downgrades. Econometric results show also that before 2007 the demand by domestic investors was significantly associated with rising public indebtedness and appears to be uncoupled from credit or business cycles.

After the crisis purchases by both domestic and foreign investors appear to be associated with credit growth rather than public indebtedness. In terms of sensitivity of domestic investors to global risk aversion, I find that investment funds in Safe Haven countries tend to purchase domestic bonds when uncertainty rises, while rising risk pushes domestic asset managers in Emerging Economies sell domestic bonds. As for private non-resident investors, results for the crisis period indicate that under high global risk aversion they sell bonds of Peripheral Eurozone and Emerging Markets and purchase debt of Core Eurozone countries. However, I find no evidence for flight-to-safety effects in Safe Haven countries.

Last but not least, what is surprising is that bond purchases by foreign central banks are significantly associated with waves of global risk sentiment. As financial crisis escalated foreign central banks suddenly sold bonds of Peripheral Eurozone countries and bought bonds of Safe Haven and Core Eurozone.

IV.2. Article 2: Impact of sovereign credit downgrades on investor holdings of government debt in developed and emerging economies

Credit rating agencies have played a crucial role in shaping global financial markets over the last two decades providing objective and valuable information on riskiness and repayment probability of sovereigns. To date empirical research focused mainly on measuring the reaction of asset prices to changes in credit ratings, but the changes in capital flows around these events remain unexplored. The objective of this study is to analyze the impact of rating changes on both bond yield and the actual holdings of government for different investor types. For the purpose of this paper a new dataset has been compiled to gauge the holdings of non-resident private investors, non-resident central banks as well as domestic banks, domestic pension and insurance funds, and domestic investment funds. The data has been compiled from national sources for a set of 24 countries from Core and Peripheral Eurozone, so-called Safe Haven developed countries, and emerging economies of different size and level of development. Econometric analysis is conducted under consideration for different country types and rating agencies, anticipative effects related to rating outlooks, and general vs. serial rating changes vs. multi-notch rating changes.

Studies on the impact of rating actions typically apply event studies on asset prices or exchange rates in daily frequency, yet in this case I need to undertake a different approach to account for data frequency, rating changes being preceded by rating outlooks, and rating actions being anticipated by the markets and effects appearing ahead of up- and downgrades. To take into account those factors I adapt framework of analysis applied by Broner et al. (2013) to analyze behavior of capital flows around crisis episodes in a cross-country setting. Specifically, for each country I examine the relationship between the change in bond holdings of a given investor groups over the period of two months ahead and two months following the rating action, i.e. altogether five months. On the technical side I am confronted with serial

autocorrelation, heteroskedasticity, cross-section dependence and use clustering method on country level and fixed time effects.

Findings for the full sample indicate that upgrades exert no consistent and significant impact neither on investor holdings nor on bond yields, no matter whether they are preceded by an outlook warning or not. However, in case of Peripheral Eurozone and Emerging Economies rating upgrades pushed domestic asset managers and pension funds to change their allocation to domestic government bonds. In contrast, results for downgrades for the full sample of countries indicate that sovereign yields and all types of domestic investors are affected by rating downgrades, in particular those preceded by negative outlooks. In case of Eurozone Periphery and Emerging Economies, foreign private investors and sovereign yields were influenced in particular by the second and third downgrades over two-year horizon.

Downgrades by S&P and Moody's in Peripheral Eurozone were associated not only with significant changes in holdings among non-resident private investors and non-resident central banks, but also with intensification of yield volatility. In Emerging Economies, downgrades by Fitch affected the holdings of foreign investors, domestic banks and pension funds, and sovereign bonds. Last but not least, investors in Emerging Economies reacted differently to 1st and 3rd downgrades over a two year horizon and to multi-notch downgrades.

IV.3. Article 3: Do local or foreign currency bonds react differently to shocks local risk factors?

The bulk of government debt has been historically issued by advanced economies has been denominated in home currencies, while emerging economies were stigmatized as unreliable borrowers and limited to borrowing in foreign currencies (FC). Over the last two decades numerous countries overcame this reputation and successfully developed local currency (LC) bond markets, yet FC issuance remains an important source of funding for numerous emerging economies. As emerging economies opened up their capital accounts and LC government bonds became liquid, tradable and accessible for international investors, foreign participation in LC bond markets increased to significant levels. As a result, in certain countries both LC and FC bonds are held by international investors.

The objective of this article is to identify and compare the drivers of LC yields and FC yields in countries with different level of economic development, different credit ratings and

different investor base. Specifically, we analyse how integral elements of sovereign risk such as political risk, inflation and credit rating determine the LC and FC yields and the FX-hedged difference between them. The novelty of our approach consists in comparing LC bonds with FC bonds using a broad dataset of individual bonds that covering both developed and emerging countries. On top of that, we analyse how the reactivity of yields evolves under different currency structures of government debt and different levels of foreign participation in local currency bonds.

The novelty of our methodology consists in matching LC bonds with FC bonds into one dataset which allows us to track the effects for the entire range of the yield curve. Since FC yields are not available in form of yield indices we ran an extensive search in the Bloomberg database and identified representative historical data for 1350 FC bonds issued by 20 emerging economies and 10 advanced countries. We subsequently match the yields between FC bonds and LC yields taking into account differences in maturities and duration and, in addition, for each LC bond we match its maturity with a synthetic currency forward in order to calculate the FX hedge. In terms of the econometric approach we employ panel configuration with standard errors adjusted using Prais–Winsten method to correct for heteroskedasticty, contemporaneous correlation across panels and autocorrelation within panels. As the dependent variable test separately: unhedged LC yields, hedged LC yields, FC yields and, the spread between FX-hedged LC yields and FC yields. All results are robust to regressions without the financial rating and to smoothing over 6 months or not smoothing at all. Empirical findings reveal three major patterns.

First, statistical patterns indicate that governments in emerging economies continue to issue in FC because FC yield are by 1% to 3% lower than the unhedged LC yield and the average maturity of FC bonds remains considerably higher than local currency bonds. When we compare the econometric determinants of the yields it turns out that in emerging economies political risk has significant and similar impact on LC and FC yields. In turn, inflation, current account balance and debt to GDP are significant and have stronger effects on unhedged LC yields than on FC yields.

Second, empirical results suggest that sovereign risk on FC debt might be perceived differently from sovereign risk of LC debt. The spread between FC yields and FX-hedged LC yields is marginally low in developed countries and investment grade-rated emerging economies, yet it becomes high in countries such as Greece, Spain, Russia or Turkey.

Econometric results for all countries indicate that the spread between FC yield and FX-hedged LC Yield is significantly and positively related to credit ratings and political risk. Interestingly, both rising inflation and debt to GDP significantly increase the FC hedged-LC spread for emerging economies, but decrease the spread for advanced economies.

Third, in emerging countries with high share of LC debt and high share of foreign participation the estimated coefficients for political risk, inflation, credit rating and current account are significant and considerably stronger than for the unrestricted sample. Also, under high foreign participation and high share of LC debt, the reactivity of LC yields is stronger than for FC yields. These findings suggest that not only higher foreign participation, but also more developed local currency bond markets render LC yields more prone to local risk factors.

IV.4. Article 4 : The Growth of Local Currency Emerging Market Debt

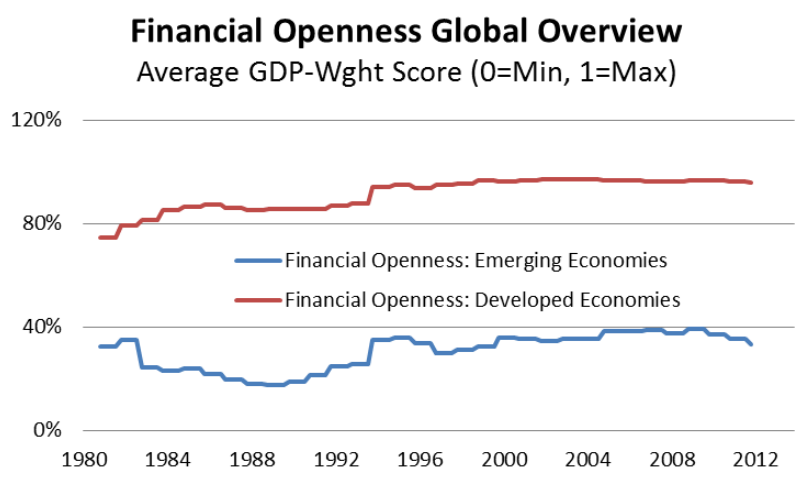
Over the last two decades numerous emerging economies successfully developed local currency bond markets and limited their currency exposure. As macroeconomic stabilization and opening up to capital flows advanced, international investors started to regain confidence and, in result, between 1996 and 2013 foreign investor participation in local currency debt markets increased from 5% to 21% on average. The objective of this study is to determine empirically what shapes domestic bond markets on one hand and what attracts foreign investors on the other. The novelty of our approach consists in using a new broad dataset on foreign holdings of government debt in 20 emerging economies.

In terms of methodological approach, we set the total local currency-denominated sovereign debt to GDP as the key dependent variable, while as regressors we focus on foreign participation as well as variables representing domestic investor demand. The fundamental challenge in this setting lies in the joint determination of the total local currency–denominated sovereign debt and the share debt owned by foreign investors. For this reason, we use two-stage least squares (2SLS) with country fixed effects using several plausible instruments.

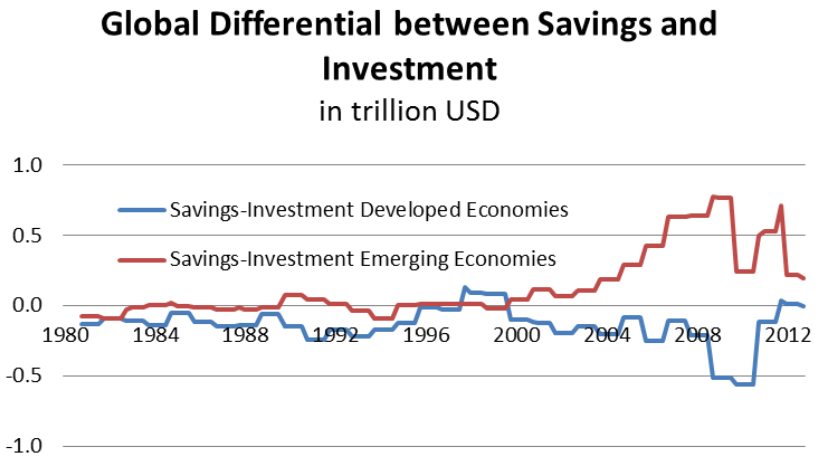
Empirical results show that foreign demand is a key driver of the growth of local currency debt in emerging markets, and that the main culprit of that increased demand is the low interest rate environment brought about by the Federal Reserve's unconventional monetary policy. The second motive of foreign currency participation is speculative, as foreign currency

interventions of central banks in emerging economies tend to attract foreign investors willing to benefit from currency appreciation. While growth and inflation forecasts remain important indicators for both the development of local currency debt market and foreign participation therein, we find that institutional factors like political risk, bondholder protection or central bank independence play a very limited role in both processes. In the light of monetary policy normalization in advanced economies our results are highly relevant for investors, issuing governments and policymakers.

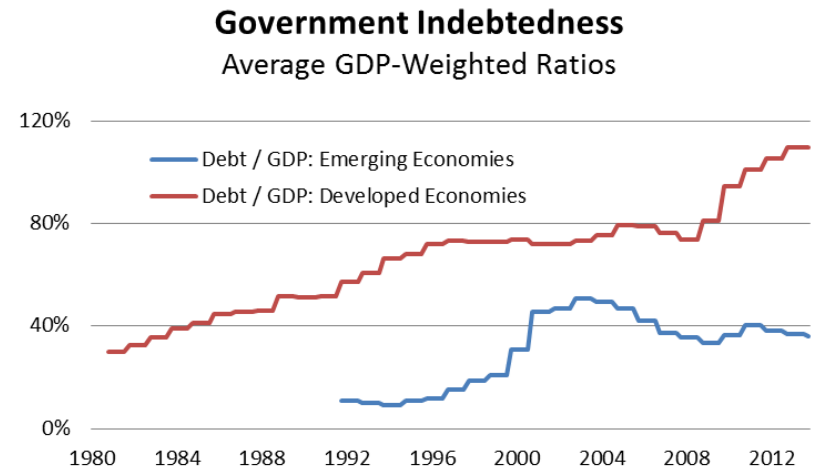
Graph 1



Graph 2

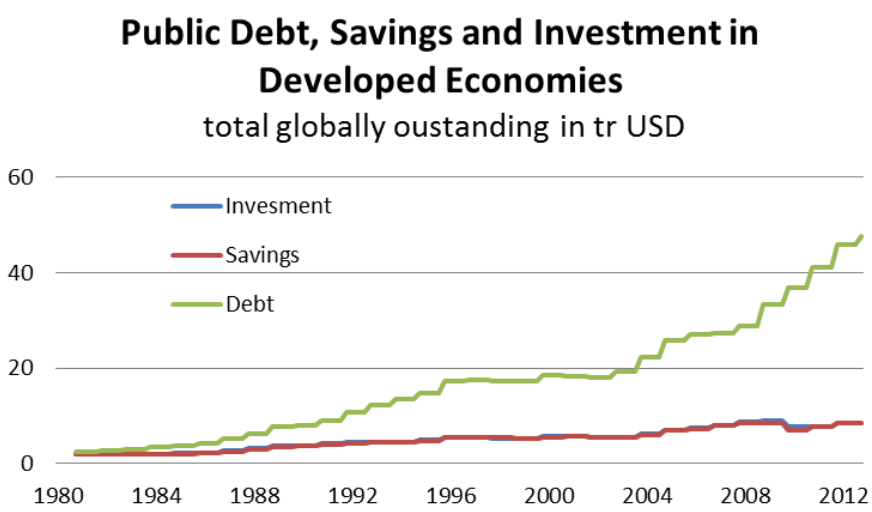


Graph 3

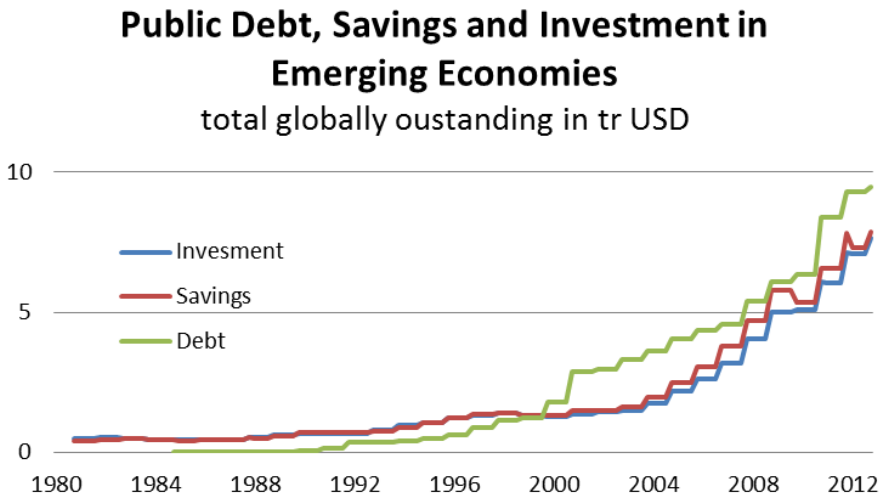


Source: IMF IFS

Graph 4



Graph 5



INTRODUCTION GÉNÉRALE

I. Introduction

L'objectif initial de cette thèse met en avance l'analyse du lien entre le risqué souverain et la stabilité du système financier, les axes principales s'étendant sur la contagion financière entre les pays émergents et développés, contagion entre le souverain et le secteur bancaire ainsi que le lien entre les banques et les notations des souverains. La littérature empirique existante est concentrée sur les déterminantes et les interactions des prix d'actifs, les expositions multilatérales des banques et le comportement des flux de portefeuille autour des épisodes de crise. En ce qui concerne l'état de recherche sur la dette souveraine, les articles empiriques se focalisent principalement sur les déterminantes des prix des contrats CDS ou les spreads souverains, par exemple Francis A. Longstaff et al. (2011), Aizenman, Hutchison, and Jinjarak (2011), Gelos, Sahay, and Sandleris (2011), ou bien le défaut souverain et la restructuration, par exemple Kruger (2003), Aguiar and Gopinath (2006). Néanmoins, la nature et l'évolution des détentions des obligations souveraines n'ont pas été explore en profondeur par les scientifiques. Afin de remplir cet espace vide j'ai construit une nouvelle base des données sur les détentions des obligations souveraines par les investisseurs domestiques et étrangers. Profitant du spectre relativement large de la base qui inclue les pays développés et émergents et les séries historiques longues, j'ai rédigé quatre articles de recherche dont deux co-écrits avec les autres chercheurs. Dans le premier article j'ai pour bout d'expliquer le changement dans les détentions par le prisme des fondamentaux, taux d'intérêt et l'aversion au risque. Le deuxième article est consacré à la relation entre les changements dans les notations souveraines et la dynamique de la base d'investisseurs, en particulier les effets des downgrades.

La composition et dynamique de la base d'investisseurs mérite de l'attention pour quatre raisons. D'abord, l'ampleur de demande de la dette souveraine peut influencer le prix d'émission des obligations sur le marché primaire c'est qui implique que la compréhension et le suivie de l'évolution de la demande pourrait être bénéficiaire pour la politique d'émission à long terme. Deuxièmement, le suivi de la base d'investisseurs est fondamental de point de vue

de gestion des risques et de la stabilité financière. Dans le cas où les obligations sont détenues par les investisseurs étrangers opportunistes il existe un fort risque d'une sortie des capitaux et hausse de taux d'intérêt ce qui mettrait au péril la capacité de refinancement de souverain. Troisièmement, la stabilité du système financier du pays est influence par les expositions des grands investisseurs institutionnelles, en particulier les banques et les compagnies d'assurance, aux obligations souveraines domestiques et étrangères. Quatrièmement, les participations des investisseurs étrangers privés et officiels, comme par exemple le FMI qui bénéficie du statut de préteur 'super-senior', peut affecter la prise de décision sur le défaut souverain.

Le périmètre initial de cette thèse s'étendait sur les économies émergentes localises en Amérique Latine, l'Europe de l'Est et l'Asie, mais comme la crise bancaire et puis souveraine a touche surtout les pays développés j'ai décidé d'élargir le spectre incluant différents pays de la Zone Euro et les autres pays développés représentatifs. En conséquence, la thèse projette une image complète de la globalisation des marchés de la dette souveraine.

Au fil de XXeme siècle nombreux économies en voie de développement ont subi les crises bancaires, souveraines et de change, parfois même en forme de deux ou trois crises à la fois, comme explique par Kaminsky et Reinhart (1999). Typiquement la source des crises était à l'origine d'endettement en monnaie forte, secteur bancaire instable, l'ouverture du compte financier et vulnérabilité externe élevée. Après celles lésons douloureuses, plusieurs économies émergentes ont remis leur politique fiscal et monétaire sur la voie de stabilité ce qui engendrait le processus de développement de la dette souveraine en monnaie locale. Comme cette problématique n'a pas encore été explore en profondeur, j'ai identifié et initié deux projets de recherche avec les co-auteurs spécialisés dans ce domaine. Le premier thème, soit l'article trois de la thèse, vise à mesurer l'impact des facteurs déterminants pour le risque souverain comme le risque politique, l'inflation et les fondamentaux macroéconomiques sur les taux obligataires libellées en monnaie locale et monnaie étrangère. Le dernier article se focalise sur les facteurs déterminants le développement du marché de la dette en monnaie locale et de la participation des investisseurs étrangers.

II. Dette souveraine et la globalisation financière

L'évidence historique montre que déjà pendant les âges moyens les banques finançaient directement les souverains. En se basant sur 400 contrats des prets datant de la fin de XVIeme ciecle, Drelichman et Voth (2011) démontrent que, malgré les quatre défauts et une reine

dotée de plusieurs guerres, le roi d'Espagne Philip II n'a jamais perdu l'accès au financement et pouvait s'endetter de nouveau en moins de deux ans suite au défaut. Ce qui est intéressant c'est que les banquiers de Gênes, étant l'appui financier principal du roi, montraient la solidarité et sens de coopération exceptionnel dans les négociations des termes des nouveaux prêts royaux.

A partir de XVIIeme siècle le financement des souverains a évolué en faveur des obligations souveraines 'échangeables', la Banque d'Angleterre étant parmi les premiers émetteurs. Flandreau (2013) présente l'évidence que le marché international de la dette souveraine en Grande Bretagne était en plein essor déjà en première moitié de XIXeme siècle. En plus, à cette époque les comités des investisseurs de la London Stock Exchange ont établi un système des Clauses d´Action Collective afin de protéger leurs intérêts et attirer les nouveaux investisseurs. Dans le livre sur l´histoire de la finance internationale Mauro, Sussman, et Yafeh (2006) analysent les donnes historiques sur les obligations souveraines émises par les pays en voie de développement entre 1870 et 1913 et ils mettent en avant l´hypothèse selon laquelle la première globalisation du marché obligataire a trouvé lieu pendant cette période-là. Ils constatent qu´à cette époque le marché de la dette était en pleine croissance, les maturités dépassaient souvent 20 ans et la Russie a même réussi d´émettre une obligation avec l´horizon de 80 ans. Les investisseurs étaient tellement confiant qu´ils acceptaient même les obligations portant les clauses de rachat par l´émetteur et dans certains cas les pays émetteurs pouvaient même utiliser les revenus provenant des exportations ou impôts futurs comme garantie. C´est qui est très intéressant de point de vue des régulateurs dans la finance contemporaine c´est que la confiance d´investisseurs pendant ce période peut être expliquée par le développement de l´Association des Investisseurs Etrangers qui avait pour mission de coordonner les intérêts des préteurs au cas de défaut. Finalement, les auteurs démontrent empiriquement que l´effet de contagion est un phénomène des années 1990 qui n´était pas connu pendant la dernière globalisation financière.

Le changement du régime économique pendant les deux guerres mondiales a poussé nombreux pays à travers du globe au défaut. En conséquence pendant plusieurs décennies les investisseurs internationaux se sont focalises sur les obligations des pays développés alors que les gouvernements des pays émergeants exploitaient les canaux de financement direct par les banques domestiques et internationales. Ce mécanisme continuait jusqu´à la crise de dette en 1982 quand les pays d´Amérique Latine, confrontes avec les taux d´intérêt élevés et prix de matières primaires bas, ont déclaré faillite envers les banques américaines. Parmi ces pays

quelques-uns ont réussi de restructurer leur dette malgré la manque de confiance des investisseurs et ce n´était qu´en 1988 quand le plan de soulagement, libelle “plan Brady”, a été mis en place pour donner une nouvelle chance aux souverains en difficulté. Ce plan a engendré le processus de remplacement des prêts bancaires internationaux par les obligations échangeables.

Il est considéré qu´à partir de ce moment-là les c´était dans l´intérêt des gouvernants émergeants d´émettre la dette plutôt que se limiter aux conditions des banques alors que l´ouverture des pays émergeants a complété le processus de globalisation financière. Graphe 1 indique que selon la mesure de Chinn et Ito (2008) entre 1988 et 1995 le niveau de l´ouverture financière a presque double passant de 23% à 40%. Comme illustre le Graphe 3, contrairement aux économies développées les gouvernements des pays émergeants ont réussi de garder les ratios d´endettement stables. Cet effet est en partie lie aux déséquilibres globaux entre l´épargne et l´investissement, plus spécifiquement le capital flottant des pays émergeants qui cherchent d´élargir leurs réserves de change vers les économies avancées qui offrent les actifs considères ´surs´, l´argument qui a été évoqué entre autres par Bernanke (2005) et Caballero et Krishnamurthy (2009). Autrement dit, pendant les dernières deux décennies les économies émergentes se sont transformés des importateurs de capital vers exportateurs de capital tandis que les banques centrales et fonds souveraines dans ces pays ont atteint un statut important parmi les investisseurs obligataires.

Finalement, le développement des marches de la dette locale est devenu un aspect important dans la globalisation financière. Suite à la stabilisation macroéconomique et modération des vulnérabilités externes dans les années ’90 et ‘2000 les agences du trésor ont saisi l‘opportunité pour émettre les obligations en monnaie locale. Comme les taux obligataires sur celles-là étaient beaucoup plus élevés par rapport aux taux dans les pays avancés, les investisseurs internationaux venant surtout des pays avancés ont commencé d´y prendre l‘intérêt. Cette évolution a complété les relations d´émission et d´investissement entre les deux groupes des pays. Néanmoins les relations macroéconomiques qui ont accompagné cette évolution restent très différentes dans les deux groupes des pays, comme indiqué dans les graphs 4 et 5. D´abord, les économies avancées continuent d´avoir le niveau d´épargne aligné avec le niveau d´investissement alors que dans les pays en voie de développement l´épargne reste supérieur à l´investissement. Deuxièmement, tandis que les économies en voie de développement restent relativement peu endettés, entre 2004 et 2012 l´accumulation de la dette dans les pays avancés a dépassé la croissance de l´épargne et d´investissement.

III. Le lien entre la dette souveraine et les institutions financières en tant que un element clé pour la stabilité du systeme financier global

Dans la vaste littérature sur la dette souveraine, défauts et restructuration on trouve presque partout une distinction simple et universelle entre les investisseurs domestiques et étrangers. Pourtant, parmi les investisseurs obligataires on peut distinguer entre les banques centrales, les fonds souverains, les banques commerciales et d´affaires, les fonds mutuels, les compagnies d´assurance, les fonds de pension, les entreprises non-financières et même les individus. Dans cette thèse j´aimerais jeter une nouvelle lumière sur les différents types d´investisseurs.

La crise européenne a montré que le lien entre les gouvernements et les banques est fondamental pour la stabilité financière d´un pays, mais pour la zone monétaire entière. Acharya, Drechsler, et Schnabl (2012) montrent que ce lien est particulièrement dangereux dans la constellation où les souverains jouent le rôle de préteur de dernière instance, les banques souffrent des problèmes de liquidité et en même temps les banques détiennent les obligations souveraines de mauvaise qualité ou émises par le gouvernement domestique. Quand la tension sur le marché augmente les investisseurs ont tendance de paniquer dans l´absence des mécanismes de résolution efficaces et en résultat les spreads de crédit des banques et de souverains s´écartent. Acharya and Steffen (2013) élargissent cette chaîne des relations avec l'hypothèse que les banques en difficulté financière sont susceptible d´acheter les obligations souveraines douteuses pour maximiser le profit en améliorant les ratios de liquidité ce qui renforce le lien entre les banques et les souverains et rendent la situation plus risquée. Finalement, les résultats empiriques présentés par Arslanalp and Takahiro (2012) indiquent aussi que les banques étrangères ont la tendance de vendre les obligations d´état en cas de détresse.

IV. Le résumé des articles et l'apport scientifique

Dans les paragraphes suivants je présente un résumé de la motivation scientifique, le plan méthodologique, les résultats empiriques et les conclusions de chaque article de recherche.

IV.1. Article 1: Les déterminants de la demande interne et externe pour la dette souveraine dans les économies avancées et émergentes: les fondamentaux contre le sentiment de marché

Les objectifs de cet article sont multiples. L´article introduit d´abord la base des données sur les détentions des obligations souveraines, il présente la structure et dynamique de le demande pour la dette d´état et finalement il présente l´analyse de comportement des investisseurs obligataire en fonction des indicateurs macroéconomiques et financiers, taux obligataires, notation souveraines et sentiment du marché.

Afin d´analyser les différences dans les déterminantes de la demande pour la dette j´introduis une nouvelle base des données basée sur les sources nationales comportant 28 pays développées et émergents. La base inclut entre 3 et 20 ans de couverture par pays et permet de suivre les détentions des institutions étrangères privées, banques centrales étrangères, banques commerciales, fonds d´investissement, fonds de pension et compagnies d´assurance et des banques centrales domestiques.

En ce qui concerne la méthodologie empirique, pour analyser les déterminantes de demande de chaque groupe d´investisseurs j´applique la spécification similaire à celles de Mehl et Reynaud (2010) ou bien de Baldacci et Kumar (2010). La nouveauté de mon approche compare aux études précédentes consiste en retournement des variables dans l´équations, c'est-à-dire j´analyse les changements des détentions par type d´investisseur comme la variable à expliquer et j´utilise les taux d´intérêts ou les indicateurs financiers en tant que variables explicatives. Pour chaque groupe d´investisseurs je conduis l´analyse sur la période 2001-2012 et séparément pour les sous-périodes 2001-2007 et 2007-2012, je divise le spectre

par groupe des pays. J´utilise la méthode de panel développé par Driscoll and Kraay (1998) pour corriger les effets de hétéroscédasticité, autocorrélation et dépendance entre les sections.

Les résultats statistiques sont les suivants. Tandis que le montant global de la dette gouvernementale a plus que triplé entre 2001 et 2011, la participation des investisseurs étrangers est passée de 20% à 28% ce qui peut indiquer que le processus d´endettement peut être lié à la globalisation financière. Ce qui est surprenant c´est que les banques centrales étrangères ont accumulé les obligations souveraines plus rapidement que les investisseurs internationaux privés et à la fin de 2011 les détentions des deux groupes étaient presque comparables. La structure des investisseurs varie fortement entre les pays. Les investisseurs étrangers détiennent entre 40% et 90% de la dette allemande, française et néerlandaise alors que aux Etats-Unis, Royaume-Uni et Danemark moins de 30% est détenu par les acteurs externes et moins de 10% en Japon. Finalement, la participation des investisseurs étrangers dans la dette locale des pays émergeants a significativement augmenté pendant la dernière décennie et atteint le niveau record en Mai 2013.

Les résultats économétriques indiquent qu'avant la crise financière les investisseurs étrangers privés, les banques et les fonds d´investissement se comportaient de manière opportuniste en achetant les obligations souveraines quand les prix augmentaient et vendant quand ils baissaient. Avant la crise les investisseurs étrangers privés La perception du risque souverain a évolué dans le temps, car avant la crise les investisseurs étrangers privés achetaient la dette des pays avec la croissance élevée, les déficits budgétaires importants et les taux plus élevés. A partir de 2007 la demande des investisseurs internationaux s´est dirigé vers les pays avec les taux bas, soit les obligations considérées comme valeurs refuges. Ce qui est remarquable de point de vue des régulateurs c´est que les flux internationaux sous-jacents sont significativement liés à la baisse des taux obligataires dans certains pays et hausse des taux dans les autres. Par contre, les banques centrales étrangères ont la tendance d´acheter les obligations au taux bas et notations élevées et vendre lors d´augmentation du spread ou des downgrades.

Les résultats montrent aussi qu´avant 2007 la demande des investisseurs domestiques était liée au niveau d´endettement et relativement découplé des indicateurs de crédit ou d´activité. Après la crise les achats d´obligations par les investisseurs domestiques et étrangers paraissent de suivre la croissance de crédit privé plutôt que l´endettement publique. En ce qui concerne l´aversion au risque des investisseurs domestiques, les résultats montrent que les fonds

d´investissement dans les pays avancés achètent les obligations domestiques quand l´incertitude augmente alors que les fonds d´investissements actifs dans les pays émergents vendent les valeurs domestiques. Les résultats économétriques indiquent aussi que suite à l´augmentation de l´aversion au risque les investisseurs internationaux vendaient les obligations de la Périphérie de la Zone Euro et les Émergents et ils achetaient les obligations de pays Euro ´Core´. Je ne trouve pas des résultats pour confirmer les effets de vol des capitaux vers les valeurs refuges. Finalement, les résultats démontrent que les achats d´obligations par les banques centrales étrangères sont menés par le sentiment global du marché. La hausse de l´aversion au risque a poussé les banques centrales non-résidentes à remplacer les obligations des pays périphériques de la zone euro par les actifs de pays Core et les autres pays avancés.

IV.2. Article 2: Impact des downgrades de la dette souveraine sur les detentions obligataires dans les économies avancées et émergantes

Pendant les dernières deux décennies les agences de notation ont joué un rôle primordial dans la formation des marchés de la dette souveraine. La littérature empirique dans cette thématique est focalisée sur l´impact de changement des notations sur les prix d´actifs, mais la dynamique des flux des capitaux autour de ces évènements n´a pas été exploré jusqu´ici. L´objectif de cette étude est d´analyser l´impact des changements des notations souveraines sur les taux obligataires et les détentions des obligations gouvernementales pour les différents types d´investisseurs. Pour arriver à cette fin j´ai construit une base des données pour les 24 pays avancés et émergents. L´analyse économétrique met en lumière l´impact par type d´agence, les effets d´anticipation, les notes publiées par les agences, les changements des notations consécutives et par plusieurs crans.

Les articles scientifiques sur les changements des notations typiquement appliquent la méthode d´étude d´évènement pour analyser l´impact sur les prix d´actif avec la fréquence quotidienne. Dans mon cas je suis confronté avec la fréquence des données basse, les changements des ratings étant précédés par les avertissements et les changements des notations étant anticipés en avance par les marchés financiers. Pour prendre en compte ces facteurs j´utilise le cadre d´analyse similaire développé par Broner et al. (2013) pour analyser

le comportement des flux des capitaux autour des épisodes crises pour un vaste panel des pays. Sphériquement, pour chaque pays j´analyse la relation entre le changement des détentions par type d´investisseur et les taux deux mois avant et deux mois après chaque évènement. Pour adresser les problèmes résultant de hétéroscédasticité, autocorrélation et dépendance entre les sections j´utilise la méthode de clustering au niveau de pays et les temporels fixes.

Les résultats économétriques pour l´échantillon complet indiquent que l´amélioration de la note (upgrade) n´affecte pas les détentions ou les taux obligataires de la manière consistante. Néanmoins, dans la Peripherie de la Zone Euro et les pays émergents suite aux upgrades les fonds d´investissement et de pension domestiques ont changé leur allocation vers les obligations domestiques.

Les résultats pour l´échantillon total suggèrent que les taux obligataires et les types d´investisseurs sont impactés par les downgrades, en particulier si c´est précédé par un outlook négatif. Dans la Peripherie de la Zone Euro et les pays émergents les abaissements consécutifs ont significativement affectés les détentions des étrangers privés et les taux obligataires.

Finalement, les downgrades par S&P et Moody´s dans la Périphérie de la Zone Euro étaient associés pas seulement au changement des détentions des non-résidents privés et des banques centrales étrangères, mais aussi avec l´intensification de la volatilité des taux. Dans les économies émergentes les downgrades par Fitch ont impacté les détentions des étrangers, banques domestiques et fonds de pension domestiques ainsi que les taux obligataires.

Les résultats présentés mettent en évidence que les downgrades jouent un rôle important pas seulement pour les taux obligataires, mais aussi pour la structure d´investisseurs et ainsi le financement d´état à long terme.

IV.3. Article 3: La sensibilité des taux obligataires en monnaie locale et forte aux facteurs de risque

Tandis que la grande partie de la dette gouvernementale des pays avancés a été émis dans la monnaie locale (ML), les pays émergents étaient longtemps stigmatisés comme les préteurs peu fiables et effectivement limités à la dette en monnaie étrangère (ME). Pendant les dernières deux décennies certains pays émergents ont réussi de surmonter le manque de confiance en développant un marché de la dette locale. Accompagné par la stabilisation macroéconomique et l'ouverture de compte des capitaux, graduellement les obligations souveraines sont devenues plus liquides, facilement échangeables et accessibles aux investisseurs internationaux. Par la suite la participation des étrangers a augmenté et actuellement dans les cas de plusieurs pays la dette en ML et ME reste dans les mains des investisseurs globaux.

L´objectif de cet étude est d´identifier et comparer les déterminantes des taux obligataires en ML et ME pour l´ensemble des pays ayant un niveau de développement diffèrent, les notations différentes et une base d´investisseur distincte. Spécifiquement on analyse comment les facteurs expliquant le risque souverain comme le risque politique, l´inflation et les notations déterminent les taux en ML et ME ainsi que la différence entre le taux couvert en ML et le taux en ME. On analyse aussi la réactivité des taux pour différents niveaux d´endettement extérieur et de participation des étrangers dans la dette locale.

La nouveauté de notre approche méthodologique consiste en comparaison des taux en ML et ME utilisant les obligations individuelles pour les pays développées et émergents. Pour obtenir les séries historiques longues et fiables on a effectué une recherche approfondie dans la base des données Bloomberg et identifié plus de 1350 obligations libellées en ME émises par 20 pays émergents et 10 avancés. Par la suite à chaque taux obligataire en ME on a attribué un taux en ML en ajustant les maturités et la duration. En plus pour chaque taux obligataire en ML on détermine la couverture de taux de change passant par le taux forward. En ce qui concerne l´approche économétrique, on utilise le panel avec les erreurs ajustées avec la méthode Prais-Winsten pour résoudre les problèmes de hétéroscédasticité, dépendance entre les panels et l´autocorrélation à l´intérieur des panels. Pour assurer universalité et robustesse de notre approche dans chaque étape d´analyse on effectue quatre tests avec les variables à expliquer différentes : taux en ME, taux en ML, taux en ML couvert avec le forward de taux de change, différence (spread) entre le taux en ME et le taux en ML couvert. Les régressions ont été vérifié avec et sans notation souveraine et le lissage sur six mois. Les résultats clés peuvent être classifie dans trois groupes.

D´abord les résultats statistiques indiquent que les gouvernements dans les pays émergents ont intérêt d´émettre la dette externe car les taux en ME sont en moyenne entre 1% et 3% plus bas que les taux en ML et la maturité des obligations en ME restent plus élevée que les obligations en ML. Les résultats économétriques montrent que dans les économies émergentes le risque politique exerce un impact significatif et assez comparable sur les taux en ME et en ML. Par contre le taux en ML sont plus sensibles aux risques d´inflation, la balance du compte courant et la dette publique que les taux en ME.

Deuxièmement, l´évidence empirique suggère que le risque souverain sur la dette en ME soit distincte de celui sur la dette en ML. Le spread entre les taux en ME et les taux en MC couverts sont extrêmement bas dans les économies développées et les émergents de bonne notation (investment grade), mais cette différence devient importante dans les pays à risque comme Grèce, Espagne, Russie et Turquie. Les résultats économétriques pour tous les pays indiquent que le spread entre le taux en ME et le taux en ML couvert est significativement et positivement lié aux notations souveraines et au risque politique. Ce qui est surprenant c´est que l´augmentation de l´inflation et la dette publique fait écarter le spread pour les pays émergents, mais compresse le spread pour les économies développées.

Troisièmement, les tests sur les sous-échantillons en fonction de la structure de la dette révèlent des faits stupéfiants. Dans les pays émergents avec la dette souveraine émise principalement en ML et la détention par les étrangers est élevée, les coefficients de régression pour le risque politique, l´inflation et le compte courant sont significatifs et plus forts que pour l´échantillon général. En plus, dans cette constellation on observe aussi que les taux en ML montrent une sensibilité au risque plus forte que le taux en ME. Pour conclure, les résultats empiriques indiquent que la participation des étrangers plus élevée et le structure de dette plus orientée vers la dette domestique peuvent exposer les taux en ML au risque macroéconomique et politique. Ce message est particulièrement important pour les agences de trésor, les investisseurs et les régulateurs travaillent sur les pays émergents ayant un risque souverain élevé.

IV.4. Article 4: Développement du marché de la dette locale dans les pays émergents

Marqués par une histoire dure des crises et défauts souverains, pendant les dernières deux décennies certains parmi les pays émergents ont réussi de développer les marchés de la dette locale où les gouvernements peuvent s´endetter sans engendrer le risque de taux de change. Grace à la stabilisation sur le plan macroéconomique les investisseurs internationaux ont gagné confiance et, comme l´ouverture du compte de capitaux a significativement progressé dans l´entretemps, la participation des étrangers dans la dette souveraine locale a augmenté de 5% en 1996 à 21% en 2013.

L´objectif de cet étude est de déterminer empiriquement les facteurs qui construisent le marché de la dette domestique d´un part, d´autre part d´identifier que est-ce qui attire les investisseurs étrangers sur ce marché. La nouveauté de notre approche consiste en utilisation d´un nouvelle base de données sur les détentions de la dette par les investisseurs étrangers dans 20 pays émergents. La spécification empirique met en avant la dette en monnaie locale relative au PIB en tant que variable à expliquer et au niveau des variables explicatives on utilise la participation des étrangers et les indicateurs représentant la demande des institutions locales. La difficulté majeure de cette configuration est ancrée dans l´estimation jointe de la dette souveraine en monnaie locale et la partie de cette dette détenue par les étrangers. Pour cette raison-là on utilise la méthode de two-stage least squares (2SLS) avec les effets fixes et les instruments complexes et plausibles.

Les résultats empiriques montrent que la demande des investisseurs étrangers est un facteur clé dans la croissance de la dette en monnaie locale dans les pays émergents tandis que la politique de taux bas de la Réserve fédérale des États-Unis qui reste la force derrière cette demande. Le second motif de la demande des étrangers est spéculatif, car les investisseurs étrangers achètent les obligations des pays où les banques centrales interviennent et la monnaie s´apprécie. Ce qui est surprenant c´est que les prévisions d´inflation et de croissance sont important pour la croissance de la dette locale et la demande des étrangers, mais le indicateurs institutionnels comme le risque politique, protection des investisseurs et l'Independence de la banque centrale jouent un rôle très limite.

Les résultats empiriques présentés sont fondamentaux pour les investisseurs, les gouvernements et les régulateurs à l´égard de la normalisation de la politique monétaire et hausses des taux d´intérêt dans les pays avancés.

ARTICLE 1

Drivers of foreign and domestic demand for sovereign bonds in developed and emerging economies: fundamentals vs. market sentiment[1]

Abstract

Using a new large dataset compiled from national sources this paper attempts to explain the determinants of demand for government debt from domestic institutions, foreign private holders and foreign central banks. On global scale, despite the recent increase in public debt the share of foreign holdings across countries increased significantly, indicating that spreading financial globalization might give ground to rising government indebtedness. However, this trend might not be persistent, as international private investors appear to update their assessment of credit risk over time.

Prior to the global financial crisis, foreign private investors' were purchasing bonds issued by developed countries with higher yields and growing public indebtedness irrespective of financial stress. After the 2008 crisis, during periods of high global risk aversion, foreign investors sold bonds of Peripheral Eurozone and Emerging Markets and purchase debt of Core Eurozone countries. Also, during post-crisis period foreign investors purchasing bonds significantly contributed to falling bond yields in some countries while outflows were associated with increasing yields in others. In turn, foreign central banks purchase bonds with low yields, higher growth and higher credit ratings, and sell under rising spreads or rating downgrades. Interestingly, bond purchases by foreign central banks are also driven by the global market sentiment. Finally, the relationship between bond yields and holdings differs from country to country in terms of coefficient sign and significance level.

Author: Tomasz Orpiszewski

Keywords: Sovereign risk, public domestic debt, credit ratings, emerging economies, Eurozone economies

JEL Classification: F34, G15, H63

[1] I am extremely grateful for the comments to the participants of Conference on Foreign Exchange Reserves Management at Bank of Canada (2013), Euroframe 2013 conference, ZEW Summer Workshop 2013, UECE Conference in Lisbon 2013 and Bifec Conference 2013, as well as Orcun Kaya from (Goethe University / Deutsche Bank Research) and Alexandros Kontonikas (University of Glasgow), Manolis Davradakis (AXA IM)

I. Introduction

This paper sheds new light on the dynamics of the government debt market from investors' point of view. While the lion's share of existing literature on government debt is dedicated to the mechanics of sovereign default and international capital flows, however to this day it remains is unclear what drives investors having different investment strategies, horizons and constraints to purchase government bonds at home and abroad. The objective of this paper is to identify common and country-specific determinants of demand for local currency debt: macroeconomic and fiscal indicators, yields, sovereign credit ratings, or simply market sentiment. To analyse the differences in investment decisions I introduce a new dataset on government bond holdings in 28 emerging and developed economies based on national sources. Within each country I am able to track between 3 and 20 years of history and distinguish between private and official non-resident holders and different categories of domestic banks, investment funds, pension funds and insurance companies and domestic central banks.

Another novelty of this article consists in analysing the evolution and drivers of the investor base in countries characterized by different levels of development and stability, different currency regimes, and under different global market conditions. Thanks to significant representation of developing and developed economies, relatively long historical series and relatively high data frequency it is possible to capture medium-term dynamics in the investor base at different levels of financial stress.

In a review of empirical literature on sovereign debt Tomz and Wright (2013) and Krishnamurthy and Vissing-Jorgensen (2007) state that the relationship between sovereign default and composition and dynamics of the investors base remains widely unexplored. Since the beginning of the Eurozone crisis several researchers, Andritzky (2012a), (Merler and Pisani-Ferry 2012) and (Arslanalp and Takahiro 2012), presented new datasets on developed economies drawing attention to foreign bondholders. As for emerging economies, the lion's part of existing reports and academic literature on emerging economies focuses on the impact of foreign purchases on yields or yields volatility, e.g. (Peiris 2010), or on foreign-currency debt, e.g. (Eichengreen and Mody 1998). The objective of this paper is to gain a broader perspective of the demand for government debt and explain the dynamics of investor behaviour through the prism of observable macroeconomic and fiscal factors, global factors, influence of rating agencies and market sentiment.

The key findings are the following. While the global amount of outstanding government debt more than tripled between 2001 and 2011, the share of foreign holdings across countries increased from 20% to 28% indicating that rising indebtedness might be coupled with spreading financial globalization. Interestingly, foreign central banks have been stocking government debt at a greater pace than international private investors and at the end of 2011 central banks' holdings were only slightly below private stocks. Investor structure varies strongly across countries. While foreign investors hold between 40% and 90% of government debt issued by Eurozone countries with Germany, France and Netherlands being most exposed to external demand, 90% of Japanese and 70% of US, UK and Danish debt is held domestically. Also, the share of foreign investors holding emerging market debt has been consistently rising over the last ten years reaching record levels in May 2013.

Econometric findings indicate that prior to the crisis that international private investors, banks and investment funds were return seekers that purchase government bonds when bond prices increase. Not surprisingly, risk perception by international investors evolved over time. Prior to the crisis private international investors tend were purchasing debt of countries with higher growth, rising public indebtedness and higher yields. From 2007 onwards international private flows were directed to countries with lower yield levels and, perhaps more importantly, private inflows are significantly related to falling sovereign yields in some countries while outflows are associated with increasing yields in others. In turn, foreign central banks purchase bonds at low yields and better credit ratings, and sell under rising spreads or rating downgrades.

As far as fiscal and macroeconomic fundamentals are concerned, the results are also startling. Changes in domestic holdings are significantly associated with rising public indebtedness, but appear to be uncoupled from credit or business cycles. Before 2008, countries experiencing rising public indebtedness, in particular Greece and Spain, attracted inflows of international private investors, while official sector investors withdrew funds from those countries. After the crisis purchases by both types of investors appear to be associated with credit growth rather than public indebtedness.

In terms of sensitivity of domestic investors to global risk aversion, I find that investment funds in Safe Haven countries tend to purchase domestic bonds when uncertainty rises, while rising risk pushes asset managers in Emerging Economies sell domestic bonds. As for private non-resident investors, results for the crisis period indicate that under high global risk aversion they sell bonds of Peripheral Eurozone and Emerging Markets and purchase debt of Core Eurozone countries. However, I find no evidence for flight-to-safety effects in Safe

Haven countries. What is surprising is that bond purchases by foreign central banks are significantly associated with waves of global risk sentiment. As financial crisis escalated foreign central banks suddenly sold bonds of Peripheral Eurozone countries and bought bonds of Safe Haven and Core Eurozone. As a result the share of debt held by foreign central banks reached over 40% in France and Germany.

Given rising importance of sovereign risk and advancing financial integration, monitoring holdings of government debt becomes increasingly relevant for global financial stability.

II. Holders of government debt: new dataset and classification

II.1. The new dataset

This new dataset has been created using data from national sources, mainly central banks, ministries of finance, statistical authorities and depositories. It includes historical series of holdings of debt instruments issued in local currency by governments in 28 countries located in Europe, North and Latin America, and Asia. Economies covered by this study differ in terms of size, currency of issuance, macroeconomic stability, currency regime, level of indebtedness and level of development of the financial sector. Presence of emerging economies together with non-euro developed countries provides a broader and more universal view on evolution of the investor base than the existing cross-country datasets constructed by (Andritzky 2012a), (Merler and Pisani-Ferry 2012) which focus on developed countries and comparable to the two datasets by (Arslanalp and Takahiro 2012) covering separately developed and emerging economies. Comparison in terms of geographic coverage is included in the Appendix Table 3.

In this study I focus on the period 1996 to 2012, which covers several crises in emerging and developed markets, the creation of the Euro Zone and the gradual development of local currency debt markets in emerging economies. In terms of historical timespan it is in line with the studies by (Andritzky 2012a), (Merler and Pisani-Ferry 2012) which start between 1996 and 2004, and has better historical coverage than (Arslanalp and Takahiro 2012) which starts in 2004. Moreover, data for all countries is available at monthly or even quarterly frequency, which makes it possible to capture the short-term changes more efficiently than with annual data as it is the case in (Andritzky 2012a).

Another strength of this database is presence of the maturity structure of bond holdings. As presented in Table 1, data for 13 out of 16 is published with distinction for bills and bonds. Moreover, data for Poland, Iceland and Peru include holdings by bond issue, whereas data for Czech Republic and Denmark shed light on holdings by year of maturity.

The key advantage is that, viewed from the risk aversion angle, distribution by maturity allows to verify different behaviour and apply different strategies at the short and long end of the curve when monetary and liquidity conditions change.

II.2. Debtholder Classification

The objective of the classification is to distinguish clearly between non-residents and various types of domestic holders following broadly the guidelines set by the European Commission[2] and the IMF. The rationale behind classification goes back to inherent differences in interests, knowledge of financial markets and risk aversion. In reality only a handful of 16 countries considered in this study apply similar categorization. Furthermore, very few countries are in position to distinguish between different types of foreign bondholders. Number of investor categories and subcategories varies strongly between countries ranging from two in Portugal to 26 in Czech Republic. To circumvent this lack of consistency[3] between datasets it is essential to regroup original categories into standardized one according to investor characteristics. As can be seen in Table 1, I developed a proprietary bondholder classification that would ensure most consistent number of categories across countries and focus on key categories: non-residents, banks, general government, insurance and pension funds, mutual funds, households and non-financial companies. While the attribution is straightforward for banks, non-residents and domestic central banks, classifying other domestic actors requires certain assumptions on investor profiles in terms of risk, return and investment horizons. Following this approach, I assume that pension and insurance funds are long-term oriented and less liquidity-driven and I merge these two categories into one group. In contrast, investment and mutual funds, more return-oriented and liquidity-prone, are compatible with objectives of financial auxiliaries like securities brokers.

As for holdings of non-resident central banks, I use the Coordinated Portfolio Investment Survey (CPIS) dataset to retrieve statistics on holdings of government debt held as reserved assets by foreign central banks[4]. I convert those series into local currency and split the aggregate series of non-resident holdings reported by national sources into foreign official holdings (CIPS) and remaining private official holdings. In turn, data on debt held by

[2] Further information on European system of national and regional accounts (ESA95) is available on the Eurostat webpage. IMF Dissemination Standards Bulletin Board (DSBB) is available on the IMF website.

[3] Several datasets include negative figures, i.e. Japan Bonds 1998-1999 for Investment Funds, UK Bonds several observations between 2002 and 2008 for Banks, Denmark bills in 2005, 2011, 2012 for Pension and Insurance Funds, Germany Bills 2006, 2008 and 2009 for Banks. Negative values have been removed from the analysis.

[4] I use linear interpolation to convert data from annual to quarterly frequency. Arslanalp and Takahiro (2012) calculate quarterly series using total reserve assets including cash from Cofer, but this approach requires several approximations.

domestic central banks is available only in selected countries under analysis. To account for the government bond purchases initiated by the ECB via Securities Market Programme (SMP) in 2010 and 2011, following the approach of(Arslanalp and Takahiro 2012), I assume that the composition of purchases corresponded to the share of county's debt in the total debt of countries covered by the program at a given period. I also assume that the bond purchases of Greek, Irish and Portuguese bonds started in 2010Q2, while Italian and Spanish bond acquisitions were launched at the beginning of 2011Q3.

Except for South Africa, all countries publish statistics foreign holdings, herein understood as investors with no legal residence in issuer's country. At the time of writing only the United States tracks and publishes the geographic location of holders. Foreign institutional investors operating on national soil are considered as a part of the domestic investor base since their legal status and regulation are constrained by national laws. Series on insurance and pension funds are published by 15 countries, and 14 sources inform on holdings of investment and mutual funds as well as non-bank intermediaries like dealers and brokers. Last but not least, Statistics available for Indonesia, Italy and Mexico include a large share of unattributed holdings. To rectify this incoherence, I assume that each investor group holds an equal amount of residual government bonds and attribute those holdings accordingly. (Lynge Nielsen 2011) observes that the methodologies of country classification by the IMF, World Bank and the UN has undergone significant evolution in the last 50 years. What is important with regard to my database is that IMF upgraded Czech Republic to the status of an advanced economy in respectively 1997 and 2009; however financial markets, e.g. MSCI indices, classify Czech Republic as an emerging economy. As a result, for consistency reasons I categorize Israel as developed non-euro country and Czech Republic as emerging economy throughout the period of analysis.

II.3. Data Issues

What can potentially distort the picture of bond holdings are differences in data sourcing and compilation. Interviews with Ministries of Finance, Central Banks and statistical authorities showed that holding data can be obtained either from security depositories where all transactions are registered or through direct reporting of financial institutions to authorities. It is unclear to what extent these differences at data sourcing level may affect the robustness and comparability between countries.

Methodological consistency over time is also an issue. Several countries altered the statistical coverage over time, for instance since 2007 Brazil has been publishing two

historically overlapping datasets with different holder categories that do not match each other. In several smaller economies like Latvia and Czech Republic data is plagued with significant jumps that may result from changes in ownership or legal status of large institutional investors and is not necessarily related to a massive purchases or selloffs of securities. In Bulgaria and Brazil data on foreign holdings seem to be categorized as institutional investors registered in the country as banks or mutual funds. In Peru securities sold to foreign institutional investors eventually remain on the domestic market via structured financial transactions.

Other factors susceptible of blurring the statistical comparison are related to recognition and reporting. In their statistics most authorities refer to central government debt only, four countries compile data at the federal level, i.e. including the securities issued by the state, and four countries do not provide any information at all. Several countries, for instance Germany, publish two distinct series with a different time horizon and investor categories. Since debt instruments issued by the regional governments are usually less liquid and less accessible for foreign investors than central government debt, I use the central government data wherever possible.

II.4. Comparison with other datasets

Existing cross-country studies based on national sources (Andritzky 2012a) and(Merler and Pisani-Ferry 2012) classify domestic investors into banks, public/government sector, and central banks, leaving other domestic institutional investors apart. For the common set of countries their results are consistent with my findings. In turn, Arslanalp and Takahiro (2012) combined several datasets provided by the World Bank, IMF and BIS to estimate the participation of foreign private banks, foreign official sector holders, foreign non-banks as well as domestic banks, domestic central banks and domestic non-banks. Nevertheless authors mention that their work is not free of measurement errors. It is noteworthy that this approach yields significantly different statistical results than using national sources. Comparing my dataset compiled from national sources to the dataset created using international databases indicates an average absolute difference of 11% for domestic banks and 7% for non-residents. More importantly, the maximum absolute difference for a given period reaches 26% for domestic banks and 33% for non-residents. These differences can be attributed to some extent to the usage of general government debt and market values by the IMF in contrast to central government debt at nominal value in my base. To sum up, although those two approaches to data classification are not perfectly compatible and cannot be used interchangeably, international sources shed some light on distribution of non-resident holders, which is not

negligible in several developed countries. Appendix Table 1 presents differences in coverage between these datasets.

III. Motives for holding government debt

III.1. Global Safe Assets

It is needless to say that rationale for holding global "safe haven" bonds, i.e. bonds of US, UK, Germany, France and several other developed economies, is different than purchasing debt of other countries. (Krishnamurthy and Vissing-Jorgensen 2012) identify three key motives for holding U.S. government debt:

1) Safety. Government bonds represent safe return compared to private sector securities, i.e. equities or corporate debt, and do not require complex and subjective credit valuation models. They are also used as refuge assets in times of rising risk aversion. This motive is particularly valid for households, investment funds, pension funds and foreign central banks.

2) *Neutrality*. Local and state governments as well as foreign central banks are de facto restrained in their choice of private sector assets and can only hold bonds of domestic or foreign governments.

3) *Liquidity*. Government bonds are typically the most liquid instruments in the market which is crucial for investors facing short-term liquidity constraints, i.e. households, mutual funds and credit institutions as well as central banks that manage actively large reserve positions.

Empirical research on aggregate demand confirms the above-mentioned criteria for the case of United States Treasuries. (Krishnamurthy and Vissing-Jorgensen 2012) find evidence that the supply of US government securities is closely related to the aggregate demand for liquidity on one hand, measured as the spread between Insured Certificates of Deposit and a Treasury bill of comparable maturity, and on the other hand to the aggregate demand for safety measured as the spread between Baa and AAA-rated instruments of comparable liquidity. Beber et al. (2009) show that in the European Monetary Union, the second largest supplier of reserve currencies, the relationship between liquidity and safety appears to be more complex. Their findings indicate that although in tranquil times sovereign yield spreads

can be explained by differences in credit risk, in times of financial stress investors tend to chase liquidity and not necessarily quality[5].

Surprisingly, academic research on the composition of demand for government debt remains scarce. (Krishnamurthy and Vissing-Jorgensen 2007) argue that different groups of government bondholders likely have different motives for holding US Treasuries and, as a result, have different elasticities to changes in the spread between corporate bonds and government debt. Their findings show that foreign central banks are least reactive to changes in government bond prices, whereas state governments and private domestic banks are in the middle range. In turn, households, mutual funds, insurance and pension funds as well as foreign private investors adjust their holdings of Treasuries very swiftly rebalance their portfolio as bond credit risk changes. Authors argue that U.S. Treasuries carry certain "convenience value" that rises when the supply of debt is low and falls when it is high. The convenience value is also the missing puzzle explaining why the demand curve for Treasury securities is not perfectly elastic.

(B.S. Bernanke 2011) points towards strong heterogeneity in investment objectives driving foreign demand for U.S. assets. He presents evidence that between 2003 and 2007 European investors allocated less than one third of their funds into AAA-rated US securities and the two thirds in high-yielding stocks as well as corporate and mortgage debt, while over 75% of capital flows from "saving glut" countries to the US was invested in government and agency debt. These findings open the discussion what factors drive investors to purchase government bonds issued by safe havens.

Hypothesis 1: in Safe Haven and Core Eurozone countries, private investors are driven by returns in normal times and rebalance towards safety and liquidity under financial distress
Hypothesis 2: foreign central banks are likely to seek safety, liquidity and exchange rate stability

III.2. Global safe assets, international imbalances and asset shortages

The dynamics of demand and supply of investable capital differs between developed countries and emerging markets. In certain emerging countries national savings exceed investment opportunities. In financially open economies excess savings are being channelled

[5] It is noteworthy that authors' analysis timeframe spans from April 2003 to December 2004 where the magnitude of the turbulence was lower than during the banking and sovereign crisis of 2008 and 2010.

to developed economies, while in less financially open economies excess savings are invested in domestic debt which lead to higher bond prices.

In a memorable lecture (Ben S. Bernanke 2005) explained that, although primary motive of those purchases goes back to the objective of foreign currency stability, what drives demand for US debt are excess savings accumulated in emerging economies that are not invested at home. In consequence, interest payments on capital invested in "safe haven" result in improving current account balances in investor countries and deteriorating in recipient countries, in other words "savings glut" in emerging economies translates into global imbalances. (Caballero and Krishnamurthy 2006) suggested that global imbalances, conundrum of low bond yields and speculative bubbles fall in the same basket as asset shortages in emerging economies. Through a theoretical analysis authors show that underdeveloped domestic financial sector leads to emergence of real estate bubbles financed by overexposed domestic institutions and international investors who undervalue the risk. Authors state that governments can tame the formation of domestic asset bubbles by opening the capital account or by issuing public debt that crowds out private investment. However, efficiency of such sterilization is guaranteed only if debt issuance is large, which can lead to excessive indebtedness in the long run.

Chen and Imam (2013) analyse a large set of emerging economies between 1996 and 2008 and realize that, despite strong economic growth, the development of equity and corporate bond markets has not been adequate to the rise in domestic savings. Asset shortages, defined as the difference between national savings and capital invested in assets at home and abroad, are more likely to occur in larger countries with lower credit rating and facing positive fiscal balances and lower trade openness. Global factors like higher world GDP growth and higher US interest rates tend to reduce asset shortages pushing domestic exporters to seek financing for new projects. Finally, domestic asset bubbles resulting from excess savings are significantly related to capital openness, lower government stability and higher corruption.

Hypothesis 3: domestic investors are likely to hold more domestic bonds in countries prone to asset shortages, i.e. where level of development, market capitalization and financial openness is lower

III.3. International investors and bond yields: chasing returns?

Several empirical studies indicate that international investors are in general return chasers. Empirical findings of (Bohn and Tesar 1996) show that international equity investors

tend to move into markets with high expected future returns that are on average sub-optimal from the risk diversification point of view. In bond markets, however, the causation between yields and foreign participation remains more ambiguous.

Warnock and Warnock (2009) revisit Alan Greenspan's statement that, compared to the impact of falling inflation expectations and yield volatility on the long end of the curve, foreign capital inflows contributed only marginally, by less than 50 basis points, to the long-lasting reduction in yields in the United States. Their analysis of long-term yields between 1984 and 2005 indicated that, controlling for other factors, without foreign demand Treasury yields at the end of 2005 would be almost 80 basis points higher, significantly higher than predicted by Alan Greenspan. In a recent cross-country study on bondholders (Andritzky 2012a) shows that in developed countries, including large Eurozone members, lower government yields are usually associated with higher participation of foreign investors.

Looking at a set of ten emerging economies, (Peiris 2010) finds that one per cent increase in foreign participation lowers long-term bond yields by 6 bps on average[6]. However, contrarily to authors' expectations, impact of foreign holdings on bond volatility differs between countries and remains widely unexplained[7].

Other studies prove the contrary. Tokuoka (2010) focuses on the relationship between low yields on Japanese bonds and participation of foreign investors, central bank and household and corporate sectors[8]. Contrarily to other studies, he finds that one percentage point increase of foreign ownership of JGBs pushes up the yield by ca. 11 basis points, which is non-negligible assuming that Japanese yields oscillated between 1.5% and 2.0% over the period 1998 – 2009. In turn, one percentage point rise in financial wealth of domestic institutions and households lowers bond yields by 2 basis points. Author suggests three Japan-specific factors may be at origin at those findings: large pool of household assets accumulated through high saving rates, strong home bias and risk aversion of the household sector, and existence of large and stable institutional holders[9]. (Burger, Warnock, and Warnock 2010) find that that past bond returns or exchange rate volatility did not influence foreigners' investment decision in emerging economies.

[6] Dataset from Asiabondonline and IMF Country Desk. Authors control for nominal short-term policy rates, inflation, fiscal deficit, current account deficit, US interest rate. They also verify the robustness towards cyclical factors, proxied by GDP growth, and global risk aversion, proxied by VIX

[7] Results obtained from Garch model are significant only in four out of ten countries and show that, in reaction to increased foreign purchases, bond volatility tends to rise in Korea and fall in Malaysia, Mexico and Turkey.

[8] Household and corporate sectors are proxied by net financial wealth held by household. Author control for gross debt and participation of Bank of Japan

[9] Japan Post Bank and the Government Pension Investment Fund were holding over 30% of debt in 2006

In a comment on the interest rate conundrum (Wu 2005) states that what remains unclear is how domestic investors, who hold the lion's share of domestic debt, would react if foreign investors started to withdraw funds from the US Treasury market and if the increase in domestic demand would not be sufficient to counter-balance the effect on yields. (Beltran et al. 2012) analyze government bond prices and foreign demand can be to some extent biased by autocorrelation, ambiguity of causation between yields and foreign demand and unobservable factors driving long-term yields. Last but not least, except for (Krishnamurthy and Vissing-Jorgensen 2007) no study decomposes foreign flows into private and official capital.

III.4. International investors: sensitivity to fundamentals and global factors

Large discrepancies in the impact of foreign holdings on bond prices have three main implications. First, country-specific factors should be taken into consideration, second, influence of domestic investor groups plays a role, and third that foreign investors are not purely return-oriented and other factors need to be considered. Several studies show that it may indeed be the case.

(Kee-Hong Bae, Young Sup Yun, and Warren Bailey 2006) examine bilateral bond holdings across 45 countries using point in time analysis for 2001 and 2002 and, after controlling for the level of development, find that stronger property rights are associated with higher foreign investment in country's bond markets relative to GDP[10]. (Li L. Ong and Pipat Luengnaruemitchai 2005) argue that foreign investors play an important role in providing liquidity to the market and, due to enhanced monitoring, exert pressure on the authorities to improve governance and transparency. (Burger, Warnock, and Warnock 2010) analyse the allocation of US investment to local-currency emerging market bonds and find that US investors exhibit preference for countries with investor-friendly institutions, lower capital controls and taxation and better creditor rights. Other significant factors include a larger domestic investor base, represented as share of pension and investment funds, and lower share of foreign denominated debt. Last but not least, the (BIS 2011) and discussions with managers of bond funds show that investment criteria include also withholding taxes, issuance at longer maturities, breadth and liquidity of derivatives markets, and effective transaction cost in those markets.

[10] Authors construct a dataset based on Coordinated Portfolio Investment Survey (IMF) that includes both local and foreign currency bonds issued by corporates and governments

In theory, capital markets should lend only to creditworthy borrowers and limit funding when debt overhang arises. In reality, investors' risk perception and allocation is strongly associated with business and credit cycles in creditors' countries. In the seminal work (Fernandez-Arias 1996) argues that although creditworthiness of financial institutions in a given country are associated with global interest rates. What matters most are the monetary conditions in the creditor country and not necessarily in the borrowing country. (Kodres, Hartelius, and Kashiwase 2008) show that compression of bond spreads in emerging markets between 2002 and 2008 was due not only to improvement in country-specific fundamentals, but also to global liquidity conditions, measured in terms of expectations and volatility of fed funds futures. (Gros 2011) states that during boom episodes countries receiving large capital inflows that boost their fundamentals and makes the country risk appear lower than it is in reality. When the bust finally arrives, the slowdown in incoming flows curbs investment and pushes investors to re-evaluate risk. (Eichengreen and Luengnaruemitchai 2008) look at the intra-regional investments in bond securities in Europe, Asia and Latin America over 2001-2003. Interestingly, the results show that investment is not always directed towards the countries with higher interest rates, but usually come from countries with lower rates. Investment rationale also seems to consider level of development, credit rating and financial openness. (Chuhan, Claessens, and Mamingi 1998) show that international bond flows react to global factors, proxied by the US interest rate and US industrial production, and are particularly sensitive to country-specific credit rating and debt price.

Hypothesis 4: both local and global factors influence demand for government bonds hence investors with global exposure should react to changes in both local and international rates

III.5. Market Sentiment and Mispricing

Domestic investors tend to perceive government bonds at home as risk-free investment. However, international investors who can compare and trade debt of several countries could perceive same bonds as relatively risky. Should market pressure increase at some stage, also sophisticated domestic investors can re-evaluate the default probability of domestic government and domestic bonds can lose the risk-free status.

In a theoretical setting with domestic and international interbank markets, (Freixas 2005) shows that, due to information asymmetry and different valuation of investment risk, cost of foreign borrowing differ from domestic rates. Empirical studies conducted on different asset classes indicate that domestic and foreign investors are likely to value perceive risk and

return differently. Kang et al. (2010) assume that if domestic investors are subject to home bias and foreign investors are return-chasers on global scale, valuation criteria of each group should differ. By applying domestic and global benchmarks to stocks in Korea, authors find two interesting patterns. First, domestic or foreign valuations differ, and, second, non-residents hold stocks for which their valuation is higher than that of domestic investors. (Andrade and Kohlscheen 2010) analyse the differences in exchange rate forecasts provided by domestic and foreign institutions around presidential elections of 2002 in Brazil and discover foreign predictions over one to three years were significantly more pessimistic than domestic investors. In a large cross-country study over 2001-2003, Bae et al. (2008) find that the local advantage gains importance in countries with lower quality of information, smoothed earnings, and most importantly, lower presence of foreign and institutional investors.

It is widely assumed that if financial markets are not perfectly efficient, asset valuation is not consistent over time and corrections in valuation may result in sudden and strong price variations. However, empirical studies show also that these variations may at times be driven by market sentiment rather than sound analysis.

(Eichengreen and Mody 2000) analyse a large set of emerging market corporate and government bonds issued in foreign currencies held between 1991 and 1997 and conclude that changes in spreads are driven mainly by shifts in market sentiment rather than shifts in fundamentals. Their findings indicate that in the aftermath of the Mexican crisis, around 1996 and 1997, markets took a more benign view on fundamentals in emerging markets and, as consequence, secondary sovereign spreads fell significantly. Surprisingly, with the escalation of the East Asian crisis yields across emerging economies shot up again, even though macro fundamentals in economies outside Asia were almost unaffected. Authors describe this phenomenon as irrational exuberance[11]. (Luengnaruemitchai and Schadler 2007) analyse phenomena of bond spread compression in ten new Central and Eastern European members of the European Union that occurred despite economists' warning on rising vulnerabilities and ended in sudden upward revision of risk in 2007. Looking at residuals between fundamentals and bond prices authors hypothesize that the investors irrational exuberance was fuelled by expected improvements in fiscal discipline, implicit guarantee of a EU-initiated bailout in case of sovereign insolvency, and future membership in the Europrean Monetary.

[11] It is noteworthy that at the time liquidity in the emerging market bond sector was significantly lower and transparency and economic coverage weaker than in the subsequent decade, hence the jumps in yields are more remarkable.

Fratzscher (2012) looks at capital flows between 2005 and 2010 and observes that prior to the crisis and directly afterwards, capital flows were directed to countries with lower credit rating, while between 2007 and 2009 they shifted towards safe havens. Forbes and Warnock (2012) focus on episodes of sudden portfolio in- and outflows in developed and emerging economies in over 50 countries between 1980 and 2009. Their results indicate that that increases in global risk aversion cause both foreign and domestic investors to exit emerging markets and shift funds to safe havens[12].

De Grauwe and Ji (2012) find that between 2000 and 2008 yields of the Eurozone countries were broadly disconnected from underlying fiscal fundamentals and current account balances and that the escalation of the crisis brought a structural change in the market perception of sovereign risk, while in "stand-alone" countries, notably the UK, US, Denmark and Japan bond yields continuously reflected the underlying data. Authors conclude that government bond markets in a monetary union are structurally more fragile and more susceptible to switch from positive to negative equilibria that end with self-fulfilling crisis, as hypothesized in De Grauwe (2012). Analysing the determinants of bond yields in G7 countries between 1993 and 2012 D'Agostino and Ehrmann (2012) find that, in case of French and Italian bond spreads, risk factors have been priced in the up-run of the monetary union and following the outbreak of the financial crisis, but not in the first years of the monetary union. Finally, looking at changes in foreign holdings of government bonds across Europe Andritzky (2012a) observed a significant short-term response to shocks in yield that was particularly visible in Greece, Ireland, Portugal and Spain. Decomposition of yield volatility in those countries suggests that non-resident participation is driven to more extent by the residuals than by macroeconomic controls explaining the yields.

Hypothesis 5: foreign investors are more likely to be driven by market sentiment than domestic institutions

III.6. Sovereign risk and discrimination between domestic and foreign investors

For over three decades researchers have been trying to answer the question why governments repay their debt. In the absence of legal punishment and enforcement mechanism, the choice between repayment and repudiation depends not only on actual capacity to service debt, but mainly on the discretionary choice between living with the debt

[12] Findings show also that increases in Global Interest Rate, here proxied by the US Treasury Rate, are associated retranchment episodes

burden or facing consequences of default. Following (Eaton and Gersovitz 1981) line of reasoning, in numerous countries where the share of foreign investors holding domestic debt is elevated and potential consequences of external default for domestic financial institutions are limited, government could prefer to default rather than to repay. As suggested by Bulow and Rogoff (1989), government's political willingness to repay depends primarily on the size of debt, currency of denomination and residence of bondholders. However, in a recent review of empirical literature on sovereign debt Tomz and Wright (2013) conclude that the relationship between government's default incentives and debt composition has not been analysed empirically to this day.

As far as external debt is concerned, in the seminal article on sovereign default Eaton and Gersovitz (1981) initially suggested that governments repay foreign debt out of fear of being excluded from international trade or from lending abroad for a sustained period. Zymek (2012) finds evidence that between 1980 and 2007 in most developed and emerging countries an increase in default risk was followed by a contraction in the exports sectors that were dependent on foreign financing. As for the post-default cost of borrowing, empirical studies, Gelos, Sahay, and Sandleris (2011) among others, find evidence that even serial defaulters are able to return to the markets relatively swiftly and on acceptable conditions. Reinhart and Rogoff (2011) find evidence that domestic and external default are vaguely correlated with each other. Díaz-Cassou and Erce (2010) report that episodes of discrimination between domestic and foreign creditors indeed occurred in the past. Out of ten recent default episodes, four discriminated against foreign creditors, three adopted equal treatment, while particularly dramatic default episodes in Argentina, Russia and Ukraine resulted in preferential treatment to foreign creditors. However in certain cases it may be difficult to identify the type of holder and default selectively on domestic or foreign bondholders, as suggested by Guembel and Sussman (2009) among others, due to high dispersion among investors or due to inability to track holdings.

Hypothesis 1: Non-resident investors may be discriminated in case of an external default and are more likely to be driven by credit risk than domestic investors

IV. Empirical Methodology

In this section I discuss the choice of explanatory variables and the estimation methodology for the battery of tests in different constellations and on different country sub-groups.

IV.1. Debt sustainability

Unconstrained global investors typically analyse investment in government bonds through the prism of potential returns for a given level of risk, probability of deterioration in public finances, macroeconomic fundamentals, external vulnerabilities and institutional quality.

In absence of the underlying collateral potential recovery value of sovereign debt in case of default is almost impossible to estimate. Therefore, the value of government debt depends mainly on the underlying probability of repayment which, in turn, depends on both current liquidity situation and long-term sustainability of public finances. Hence, in the short-term, rational investors should monitor and react to changes in the debt burden and current fiscal balances, while investors with a long-term investment horizon are more likely to focus on structural indicators of the future fiscal situation.

To render public debt sustainable in the long-term government focus should lie on structural variables, such as the trend in economic growth, inflation, structural primary fiscal balances and low cost of borrowing[13]. To capture the change in these variables I follow the general sustainability equation as presented by Blanchard, Giavazzi, and Alessia (2010):

$$\text{Eq. 1 } \Delta b_t = (b_{t-1} * \frac{r_t - \pi_t}{1+ g_t}) + pb_t$$

Where, b^t is the debt to GDP ratio, pb^t is the cyclically-adjusted primary balance, g^t is the trend in real GDP growth calculating with the Hodrick-Prescott recursive filter, π_t represents inflation and r^t stands for the synthetic interest rate calculated as follows.

Giovannini and De Melo (1993) state that it is almost impossible to calculate the representative interest rate on domestic liabilities due to insufficient data availability. To calculate the cost of borrowing I follow the idea of Reinhart and Sbrancia (2011) who calculated the historical weighted-average yield of all outstanding government bonds. Not being in possession of this dataset, I assume that the weighted average debt service cost would be equal to the bond yield for maturity at time *t* corresponding to the weighted-average maturity of total outstanding debt at time *t*. The final measure is

$$r_t = i_t^{M_t^e} \; for \; M_t^e = \sum_{n=1}^{N} w_t m_n \qquad \text{Eq. 2}$$

where *r* = effective cost of debt, *i* = nominal interest rate on a government bond of maturity M_t^e, whereas M_t^e= debt-weighted average maturity of outstanding government debt at time t

[13] Further considerations include demographic projections, aging trends, dependency ratio, share of working-age population, employment, etc.

for the entire maturity range. For the debt-weighted maturity I use the data provided by the BIS or OECD, or if the yield on 5 Year government bond not available. Due to limited data availability for all missing maturities I use linear interpolation between 1 or 2 years, whichever is available, and 10 years. I also assume that the non-marketable debt bears the same cost as the marketable debt. In result, for each period of analysis, the cost of borrowing in the sustainability equation corresponds to the observed yield on government bond of maturity which is equal to the weighted average maturity of the entire outstanding government debt. Obviously, it would be precise to calculate the debt-weighted average effective cost, but the composition of debt necessary for this calculation is not available for set of countries.

Sustainability exercise is more complex for developing countries where the share of foreign currency denominated debt oscillates on average between 10% and 30%, and in case of Bulgaria, Hungary, Indonesia and Peru exceeds 40%. Since historical data on the cost of foreign currency borrowing is not available for the countries in the dataset I assume that the covered interest rate parity holds in the long term and that governments hedge their currency exposures, which is a suitable basis to approximate the cost of foreign currency debt to be comparable with cost of local currency debt. In consequence, I apply domestic interest rate on the total central government debt, in both local and foreign currencies.

While economic growth and primary balance have been adjusted for the cyclical elements, interest rate is taken at the observed market value which makes it more credible knowing that investors apply the world rate in their valuation models. Also, in reality to calculate fiscal sustainability professional financial analysts use multi-period models, but unfortunately past forecasts of economic growth and fiscal indicators are not available for the period of analysis[14].

While professional investors can forecast the future path of growth and budget balances, projecting the cost of borrowing remains a difficult task. By accounting identity, investment spending financed by budget deficits may must be financed either from national savings or net foreign borrowing. Since borrowing from domestic institutions may result in crowding out of private investment, it is in country's interest to maintain steady access to international borrowing. Analysing the sustainability of the U.S. debt Labonte (2012) states that investors are likely to demand low interest rates as long as they remain convinced by government's fiscal policy. In fact, external financing can be extremely burdensome even at

[14] Publicly accessible past forecasts of GDP growth and fiscal balances provided in the historical editions IMF World Economic Outlook for the entire set of countries start de facto around 2009.

seemingly low levels. Reinhart, Rogoff, and Savastano 82003) find evidence that serial sovereign defaulters frequently were unable to refinance themselves at debt to GDP ratios that were well below the euro area's "Maastricht Treaty" bound of 60 per cent. A rating downgrade or inconclusive behaviour of the government may change the sentiment among investors which would automatically result in higher yields. This goes back to the debt sustainability equation, since effective future cost of borrowing depend on the rates demanded by the market.

IV.2. Macroeconomic indicators

Macroeconomic conditions are a key input for both domestic and foreign actors when taking investment decisions and changes in these conditions affect valuation of their holdings. In turn, domestic investors are directly exposed to changes in growth, inflation as well as interest and exchange rates.

Growth in Credit Growth - growth in credit has been at the source of numerous banking crisis and asset bubbles, as indicated by Borio and Drehmann (2009) among others

Current account balance – current account encompasses the balance of trade, i.e. net exports or imports, and factor income, i.e. interest or dividend paid or received from abroad. It measures net foreign assets or liabilities incurred over a given period, hence negative current account deficit means that an economy is absorbing more than it is producing and its long-term liability is rising, which may lead to higher default probability for foreign currency debt. Strongly positive current account balances may be a sign of asset shortages, as explained by Caballero (2006) among others.

Financial openness. It appears that financial openness acts as a double-edge sword. On one hand, Mehl and Reynaud (2010) found that the removal of capital controls helps lower domestic 'original sin', and decrease the shape of foreign-currency debt. On the other hand, in a seminal paper Kaminsky and Reinhart (1999) explain that financial liberalization together with opening of financial account elevate the frequency and the severity of currency and banking crisis. However, in a later study Edwards (2004) shows that financial openness does not necessarily amplify the effects of capital account reversals. Last but not least, Kaminsky (2008) argues that capital controls protect inefficient domestic financial institutions leading to financial vulnerabilities. To measure the determinants of demand for bonds with regard to the last two factors I use synthetic indices provided by Aizenman, Chinn, and Ito (2008) which are well adapted for this dataset for two reasons. First, they reflect the path of exchange rate stability and capital account openness pursued in the developing countries, in particularly in

the Eurozone, at the cost of reduced monetary independence. Second, trilemma indices reflect the development towards intermediate levels of the index observable in emerging markets in the recent years.

Sovereign Credit Ratings – following the linear approach to rating conversion presented by Ferri, Liu and Stiglitz (1999) I attribute each sovereign credit rating provided by S&P, Fitch and Moody's a numeric value ranging from 5 for Caa, i.e. lowest rating above default, to 100 for AAA, i.e. safest assets. This approach does not reflect the idea that differences between low-grade ratings may have different importance for investors than at high-grades, or that ratings on the verge of investment or non-investment grade, however inconsistencies remain relatively limited.

Institutional quality. I use the Worldwide Governance Indicators based on surveys conducted by the World Bank among citizens and companies in numerous developing and industrialized countries. I look at the political stability and absence of violence, which reflects the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, and government effectiveness, which Reflects perceptions of the quality of public services, the degree of its independence from political pressures and credibility of the government's commitment to implement announced policies.

Risk Aversion. To gauge market sentiment I use the Citigroup Macro Risk Aversion Index. To measure political uncertainty I use the European Uncertainty Index developed by Baker, Bloom and Davis which is based on non-market data, i.e. newspaper coverage, future changes in the tax code, and disagreement among economic forecasters.

IV.3. Methodology: Core specification

Since my objective is to analyse the drivers of demand for government bonds I apply panel specification similar to Mehl and Reynaud (2010) and Emanuele Baldacci and Kumar (2010) to analyse the macroeconomic, fiscal and market determinants of holdings of different investor groups. Panel data approach is not only efficient with dealing with relatively short time series of quarterly data, but also allows to analyse the impact of country-specific variables across a group of countries with macroeconomic fundamentals, institutional setting and size of domestic capital market. It is noteworthy that my objective and methodological approach differ those chosen by Krishnamurthy and Vissing-Jorgensen (2007) and Andritzky

(2012b), who use holding data as independent variables to explain respectively new debt issuance[15] and bond yields.

Specifically, I intend to explain the new demand, i.e. change in holdings of government debt, by specific investor types, namely (i=1) for private non-residents, (i=2) for official non-residents, (i=3) for banks, (i=4) for pension and insurance funds, (i=5) for investment and mutual funds.

$$\text{Eq. 3} \quad \mathbf{y_{jt}}^{\boldsymbol{i}} = \mathbf{d_{jt}}^{\boldsymbol{i}} - \mathbf{d_{jt-1}}^{\boldsymbol{i}} \textbf{ for i} \in [\mathbf{1, 2, 3, 4, 5}]$$

Where $d_{jt}{}^{i}$ is the log of investor-specific holdings in local currency. While the use of log values is necessary due to the obvious difference in size between countries, I focus on the actual holdings rather than the share in total debt in order to account for the abrupt rise in outstanding debt that occurred between 2008 and 2012. This argument is valid not only in Japan where debt to GDP has been consistently growing over the entire time horizon, but also for Ireland and Spain where public indebtedness more than doubled between 2007 and 2010.
Basic reduced-form model, estimated for a panel of 16 economies denominated j and time span t between Q1 1999 and Q3 2011, consist of the following:

$$\text{Eq. 4} \quad \mathbf{y_{jt}}^{\boldsymbol{i}} = \boldsymbol{\alpha_j} + \sum_{z=1}^{4} \boldsymbol{\beta_z} \mathbf{x_{jt}^{z}} + \mathbf{v_{jt}} + \boldsymbol{\varepsilon_{jt}}$$

Where j and t are the country and time dimensions respectively, y_{jt} measures the change in investor holdings Eq. 3, x_{jt} is the vector of explanatory variables and β a vector of estimated parameters, z is the number of explanatory variables. Residuals are split into unobserved country effects; noted v_{jt} and panel level effects ε_{jt} that are independent of v_{jt}.
In the baseline regression the equation takes the following form for all investor types and regions:

Eq. 5 $$\textbf{Change in Stock of Government Debt held by Investor Type} = \boldsymbol{\alpha} + \boldsymbol{\beta_1}\textbf{Change in Public Debt to GDP} + \boldsymbol{\beta_2}\textbf{ Credit Growth} + \boldsymbol{\beta_3}\textbf{ GDP Growth Trend} + \boldsymbol{\beta_4}\textbf{Risk Aversion Index}$$

[15] Supply is defined as the spread between AAA-rated securities, which includes agency debt and high grade corporates, and Treasuries. It follows (Longstaff 2004) finding that government debt supply is correlated with the spread between Treasuries and the bonds issued by Refcorp.

IV.4. Methodology: Robustness and Coefficients Stability

Construction and heterogeneity of the dataset, choice of a turbulent time period and several data issues necessitate commensurate test and estimation. Each of the following tests is conducted separately for each investor class without distinction for country groups.

i. Structural Breaks and Stationarity

To verify the presence of unit root in the investor holding under analysis I conduct Fisher unit root tests for using both Philips Perron Estimation and Advanced Dickey Fuller. Results presented in Appendix Table 7 show that series in level contain unit roots, but first difference renders them stationary.

The dataset is not free of structural breaks that are related to two factors. First, as described in the section on data issues, the panel is not entirely free of statistical inconsistencies, changes in classification by the national sources and subjective attribution to investment categories and which is also the reason why structural breaks occur at different time periods for different panels. Second, financial crisis has brought a true structural change in behaviour of several investors. In consequence, the dataset contains structural breaks that are individual for each panel, à priori unknown and can occur at several instances in each panel which has important implications for the of unit root tests. Last but not least, Cavaliere (2005) and Xu and Cavaliere (forthcoming) show that the regular unit root tests applied to bounded variables may also fail to reject the unit root and cointegration hypothesis even if the series are actually stationary. For each I implement the test described in Clemente, Montañés, and Reyes (1998) which takes into account presence of one or two unknown structural breaks. Applying the test on 15 years of quarterly data of long-term interest rates in the US and UK authors have shown that the test performs well with relatively short datasets and even if there are less than 30 observations between structural breaks. I run the test for additive (AO) and innovational outlier (IO) unit root for one, or if necessary two, unknown breaks for each country individually and, with few exceptions, state that the dataset is not stationary at intercept or individual trends, but differencing results in stationary series for both share and log of the series. Results are presented in Appendix Tables 8 to 18.

ii. Panel Homogenity, Serial Correlation, Cross-section Dependence, Co-integration, Heteroskedasticity,

For each type of investor I test the homogeneity of my panel, as described Hsiao (2003), and find that panel intercepts and coefficients are homogenous and that random effects are preferred to fixed effects. Results of Hausman test presented in Appendix Table 7 additionally confirm these findings. However Breusch-Pagan Lagrange multiplier test for difference variances across entities between the models with or without random effects indicate that random effects do not significantly improve the estimation precision.

To verify the presence of serial correlation I use standard procedure described in Drukker (2003). Although serial correlation does not affect unbiasedness or consistency of the estimators, it can have a significant impact on efficiency and in consequence affect the estimated standard errors. Results in Appendix Table 7 show that errors are serially correlated for non-resident official investors and banks.

To verify cross-section dependence under fixed country effect for each investor type I run a Pesaran (2004) test on the dependent variable alone, and subsequently for the baseline regression. Test results in Appendix Table 8 show that the cross-section dependence is present for all investor types except investment funds where the limited sample size does not allow for a definite conclusion. I assume that all holding series are cross-section dependent by nature and correct this issue. If the cross-section dependence is not corrected, the coefficient estimates from standard panel estimators are likely to be consistent, but their efficiency may be very low.

I also detect groupwise heteroskedasticity using standard Wald test for fixed effects models, results are presented in Appendix Table 7.

iii. Method of Estimation

I apply pooled estimation for the full sample and country groups while controlling for cross-section dependence, heteroskedasticity and serial correlation. The technique of estimation of the variance covariance matrix that is most likely to provide consistent results has been developed by Driscoll and Kraay (1998). Hoechle (2006) extends the model for unbalanced panels and shows that calculated standard errors are smaller than under more efficient than standard OLS, Rogers and Newey-West. Author shows that the estimator becomes less efficient when the time dimension is drastically reduced below T=15. In my case the method is well adapted, as the panels range between 2 and 27 countries and 16 to 40

time observations within each country. Since the results vary strongly across time for most investors and settings I distinguish between the pre-crisis period between 2001Q1 and 2007Q4 and post-crisis period 2008Q1 to 2011Q4.

IV.5. Modelling the relationship between Yields and Bondholdings in cross-country and country-specific settings

To provide a complete picture of the price-demand mechanism for government bonds, I follow the empirical approach of Krishnamurthy and Vissing-Jorgensen (2007) and Andritzky (2012b) where holdings data is used to determine bond yields. While the first article is concentrated on US Treasuries and considers holdings of all investor types relative to GDP, the second one analyses sovereign bond yields of several developed economies through the prism of foreign holdings and banks' holdings. This article extends this approach in several ways. First, I look at a panel of developed and emerging economies. Second, I consider countries on individual basis to determine whether demand for government debt has a different impact on bond yields in different countries. Third, I consider the presence of endogenity between bond yields, fiscal and macro variables and bond holdings by using dynamic panel estimation, as described below.

To measure the impact on bond yields I select countries with sufficient historical coverage of holdings data on one hand and relatively high bond liquidity on the other hand. Among developed non-euro countries I retain Japan, UK, US, in Core Eurozone I focus on France, Germany, Netherlands and for the Eurozone Periphery I use Greece, Ireland, Italy, Spain. Among Emerging Economies I use Brazil, Czech Republic, Hungary, India, Poland, Turkey and Thailand. As far as bond holdings data is concerned, I use foreign public and private holdings and banks' holdings for the panel estimation and use all available series for the individual country estimations.

In terms of estimation method, in each panel setting I first run an Ordinary Least Squares (OLS) regression with country fixed effects and robust standard errors and subsequently conduct a dynamic Arellano-Bond (AB) panel estimation method proposed by Arellano and Bond (1991). While the first approach is a simple and common estimation method, AB estimator sets up a generalized method of moments (GMM) setting in which the model is specified as a system of equations and where different instruments apply to each equation. The key advantage of the AB regression lies in the possibility to input exogenous

variables as well as pre-determined endogenous variables. Another advantage lies in the treatment of fixed effects which, in a regular OLS regression, could be correlated with the explanatory variables. The choice of the AB method is also dictated by weakness of available instruments that materialized during the prior 2-Stage Least Squares estimations. The resulting reduced-form model takes the following form

Eq. 6 $\boldsymbol{sovy_{jt} = \alpha_j + sovy_{jt-1} + \beta y^i_{jt} + \beta z_{jt} + \beta c_t + v_{jt} + \varepsilon_{jt}}$

Where j and t are the country and time dimensions respectively, $sovy_{jt}$ measures the change in bond yields, y^i_{jt} is the share of government debt held by the investor *i*, z_{jt} is the vector of endogenous variables, c_t is the vector of control variables and β a vector of estimated parameters. Residuals are split into unobserved country effects labelled v_{jt} and panel level effects ε_{jt} in case of the OLS regression.

As endogenous variables I use both government debt to GDP and change in debt to GDP as factors of supply and stock of debt, as well as inflation and GDP growth trend which determine sustainability of public debt. As exogenous control variables I consider Fed Funds 3-month Futures, VIX to control for risk aversion and Oil prices to account for energy shocks.

To verify the relationship between holdings and yields for individual countries I undertake two additional tests. First I run a panel OLS regression similar to the one specified in Equation 6, but in each regression I limit the estimation exclusively to the holdings of one country by multiplying the holdings variable with a country dummy. The resulting model looks as follows:

Eq. 7 $sovy_{jt} = \alpha_j + sovy_{jt-1} + (\beta y^i_{jt} * D_j) + \beta z_{jt} + \beta c_t + v_{jt} + \varepsilon_{jt}$

Finally for each country *j* I run a simple non-panel OLS regression, as presented in Equation 8. To verify whether adding holdings variables improves the model I conduct one additional analysis without presence of holdings series.

Eq. 8 $y^j_t = \alpha_j + \beta x^j_t + \beta z^j_t + \beta c^j_t + \varepsilon_{jt}$

Last but not least, I run an alternative version on first difference of yields and holdings to see whether change in demand is related to the change in bond yields.

V. Results

V.1. Outstanding Debt and Cross-country Capital Flows

Capitalizing on the broad scope of the dataset that covers ca. 70% of the outstanding global government debt, I first examine the aggregate investor structure across countries and the underlying dynamics over the last ten years[16].

Figure 1 reveals three patterns with regard to the global sovereign bond market. First, the dollar amount of outstanding debt has more than tripled over the last decade with greatest increase occurring not surprisingly between 2008 and 2010. Second, although the amount of debt held by foreign official sector and international investors increased considerably, the bulk of government debt is financed from domestic savings. Third, share of foreign holdings increased from 20% to 28% between 2001 and 2011 indicating that rising indebtedness might be coupled with spreading financial globalization. Interestingly, foreign central banks have been stocking government debt at a greater pace than private investors, the respective growth rates being 18% vs. 12%, and at the end of 2011 central banks' holdings were only slightly below foreign private holdings.

In the following steps I focus on the dynamics of holdings over time. Figure 2 indicates that bond investment of international private investors appears to be more volatile than flows from central banks, although we should not forget that the latter series are interpolated linearly from annual data.

Figure 3 shows that private investors' allocation to government bonds appears to be associated with the changes in global risk aversion. It is striking that each sudden increase and decrease in risk aversion between 2007 and 2010 was associated with dramatic in- or outflows into government debt ranging between USD 400 bn and 800 bn QoQ. In turn, calm periods between tension episodes are characterized by flow intensity between USD 10bn and 150 bn.

As for the foreign official sector, Figure 4 shows that between 2007 and 2009 the magnitude of purchases by foreign central banks across Eurozone and Safe Haven markets varied in line with global risk aversion. Subsequently, as the Eurozone crisis began to unwind, foreign central banks withdrew their funds from Peripheral Eurozone countries and in 2011 limited their investment into Core Eurozone countries.

Until late 2011 foreign investors continued to purchase government bonds of Core and Peripheral Eurozone countries despite overwhelmingly rising risk of sovereign default. Finally, heavy outflows from Peripheral Eurozone debt markets of almost USD -400bn in the

[16] To obtain unbiased bond capital flows starting from the data provided in local currencies across countries I first calculate the difference in stocks of foreign holdings within each country and subsequently converting the resulting value into USD. It is noteworthy that if the data was first converted into USD and than differenced, a mere change in currency exchange over the period of analysis would imply a change in holdings even if the actual holdings did not vary.

second half of 2011 correspond to record inflows into Japanese, UK and US debt of over USD +740bn. Interestingly, in the aftermath of summer turbulences, in Q4 2011 Last but not least, flows into emerging market debt merely slowed down during this period.

V.2. Stylized Facts

Table 2 shows that the composition of the investor structure for the given sample as of end Q4 2011. The global investor structure can be summarized as follows.

First, most recent data indicates that private non-residents hold on average around one fifth of government debt in non-euro developed countries, almost 30% in Core Eurozone countries and Emerging Economies and over 50% in Peripheral Eurozone. The latter observation is consistent with the findings by Schoeneker (2008) and de Santis and Gerard (2006) who state that high shares of foreign investors among Eurozone countries resulted from the increase in inter-regional investments that followed the creation of the monetary union. Foreign central banks hold 5% to 10% of bonds issued by Safe Havens and Peripheral Europe and over 40% of French and German debt. Domestic banks and Pension and Insurance funds hold respectively around 20% of debt in Emerging nations and Non-Euro developed countries, in the Eurozone it is significantly less. Finally, as a result of recent Quantitative Easing and SMP Programs, central banks hold between 2% and 11% in Europe and over 23% in the US.

Second, disparities are strong within each country group and within the entire sample. Table 3 indicates that private foreign participation in Emerging Economies ranges between 14% in Bulgaria and 35% in Hungary, in peripheral Eurozone it is between 33% in Ireland and 60% in Greece. Banks hold between 2% and 57% and pension and insurance between 1% and 40%. Finally, general government holdings comprising social security funds and public companies hold almost 40% of debt in the US and around 10% in Czech Republic, Greece, Spain and Denmark.

Summing up, Safe Haven countries have on average most diversified investor base where no investor type has more than 20% of debt, debt of Core Eurozone countries is held mainly by non-residents, whereas Emerging Markets rely mainly on domestic banks and pension and insurance funds. It is noteworthy that opening of the financial account, stabilization of inflation rates and improved governance resulted in diversification of the investor base in emerging economies and convergence towards the model of developed economies, as indicated by Figures 9, 16 and 20. Findings on emerging markets partly

contradict the results obtained by Hausmann and Panizza (2011) who find low participation of foreign investors in local currency debt, though the sample considered here is significantly smaller.

V.3. Determinants of Demand by Investor Type

I this section I attempt to identify the fiscal, macroeconomic and market-related determinants of demand for government bonds are identified using simple graphical analysis as well as econometric analysis. Econometric analysis is conducted using all countries in the sample full sample and for specific country groups, and for the pre- and post-crisis periods to capture the change in investors' behavior. In Tables 3 to 8 I report only the findings that are statistically significant. Due to limited data availability of certain independent variables some extended models contain fewer observations than the baseline model.

i. Overview of Demand Drivers for the full sample

The results for all countries under analysis presented in Tables 3.A and 3.B reveal an interesting picture with regard to foreign and domestic demand.

Table 3.A shows that while the change in demand from both private and official investors is significantly and positively associated with GDP growth trend, being a sign of pro-cyclical behavior, differences appear with regard to risk indicators. In general, when the risk aversion rises international private investors tend to sell bonds, while foreign central banks significantly stock up debt held as reserves assets, at least from 2007 onwards.

Private non-resident investors increased exposure to countries with growing public indebtedness and higher yields prior to the financial crisis and higher credit growth. From 2007 international private flows were directed to countries with lower yield levels and, perhaps more importantly, private inflows are significantly related with depressing sovereign yields in some countries while outflows are associated with increasing yields in other economies. As for the official sector, foreign central banks holdings are significantly associated with low-yield countries and purchases significantly contributed to lowering yields in selected countries prior to the crisis.

On the domestic side, Table 3.B indicates that purchases by domestic investors are significantly associated with rising public indebtedness and appear to be uncoupled with the credit or business cycles. In terms of prices, both domestic banks and investment funds tend to

increase holdings when yields fall and sell under increasing yields which can be interpreted as return-seeking behavior.

Last but not least, low overall R-squared values indicate that, with exception of foreign central banks where the sample is limited, investor demand for government debt remains widely unexplained across countries and needs to be examined for each country individually, using more granular data, or considering country- and investor-specific constraints such as the amount of investable assets for domestic actors and country of origin for foreign investors.

ii. Private Non-resident Investors

Graphical Analysis. Holdings of private non-resident investors exhibit strong disparities between countries and country groups. Starting with the Eurozone, Figures 6 to 7 show that between 1999 and 2008 foreign demand was consistently rising in Italy, France, Germany and Greece; in the last two countries foreign participation reached ca. 80% when the time the 2007 crisis escalated. In France non-resident private investors receded slightly after 2008 foreign central banks. Interestingly, in Spain and Ireland private non-residents began to increase their exposure in 2008 when the bond yields became more appealing and few doubts were raised concerning its' stability.

What is striking is that foreign holdings of safe haven assets remained stable throughout the crisis period and actually increased in the United States. In Denmark private foreign investors sold almost half of their holdings when financial turmoil began, as indicated by Figure 8. Last but not least, over time private international investors gained confidence in emerging market local currency debt and foreign participation reached peaked shortly before the subprime crisis. Once the dust settled and central banks in developed economies switched to the zero interest rate policy the demand for emerging country debt picked up again. In all countries except Czech Republic.

Econometric Analysis. Significant determinants of demand by foreign private investors varies are indicated in Tables 4.A and 4.B. *Rising public indebtedness* is significantly associated with greater purchases by foreign investors in Safe Haven countries prior to the crisis and in the Eurozone throughout time. Investors exposed to emerging local currency debt do not seem to react to changes in public finances, although it is worth mentioning that in general public finances in EMs have been in relatively better shape than in DMs.

As for the effects of *global risk aversion* on demand for bonds, from 2007 onwards investors tend to sell bonds of Peripheral Eurozone and Emerging Markets and purchase debt of Core Eurozone countries. Surprisingly, I find no significant "flight to safety" effects for Safe Haven countries which is consistent with results graphed in Figure 7.

From the beginning of the crisis foreign private demand tends to face out in countries with rising political risk, in particular in emerging economies, but not necessarily in developed countries. Finally, the relationship between demand for debt and sovereign credit ratings has been significant over the crisis period. Since 2007 foreign demand for EM debt is significantly higher in emerging economies with low credit ratings, while positive coefficient for Peripheral Eurozone indicates that post-crisis rating downgrades were significantly associated with outflows of private foreign capital.

iii. Official Non-resident Investors

Graphical Analysis. Foreign reserves of central banks have been traditionally allocated to Safe Haven assets. Participation of foreign central banks ranges between 3% in Japan and 16% in the US, as presented in Figure 11. In Europe, demand from foreign official institutions started to rise significantly after the establishment of the monetary union reaching 40% in France and Germany at the end of 2011. What is quite striking is that while in France and Germany foreign participation kept increasing throughout the crisis, official demand for Spanish and Irish bonds increased under the rise in global risk aversion around 2007 and then, as the fiscal situation began to deteriorate in those countries, foreign central banks drastically reduced their exposure to Greece, Ireland and Spain.

Econometric Analysis. Econometric findings in Table 5.A indicate that allocation patterns of reserves by foreign central banks changed over time. Before the crisis demand by foreign central banks was detached from fundamentals and market conditions, while since 2008 foreign central banks invest more in bonds issued by countries with lower level of public debt, higher GDP growth, and lower yields. Allocation of reserve asset portfolio is greater to countries with higher credit ratings and lower political risk. Furthermore, foreign central banks tend to invest more when risk aversion rises, in particular in debt Safe Haven and Peripheral as indicated in Table 5.B. Purchases of foreign investors were associated with negative current account deficit in Safe Haven countries during the 2001-2007 period, which confirms Bernanke's (2005) hypothesis, and are significantly related with lower current account balance in Core Eurozone countries.

iv. Domestic Banks

Graphical Analysis. Banks represent a large fraction of demand for bonds, their holdings range from 3% in the US to 35% in Japan. Two patterns deserve particular attention. First, starting from the creation of the Euro monetary zone, domestic banks in Europe reduced their exposure to domestic government debt, but this trend suddenly reversed when the financial crisis began to spread. Second, in most emerging economies reliance on banks financing decreased to the level comparable to that of developed countries.

Econometric Analysis. Regression results in Tables 6.A indicate that domestic banks tend to invest in domestic government bonds under rising public debt, lower credit rating, higher political risk and lower financial openness. Prior to the crisis, banks increased purchases of domestic government deb when yields were higher, while from 2007 banks increase their holdings in low-yield countries and their purchases (withdrawals) are significantly related to lowering (rising) bond yields. The letter results are particularly valid for countries of Peripheral Eurozone and Emerging Economies, which indicates that banks in those countries could be classified as return seekers.

v. Domestic Insurance and Pension Funds

Graphical Analysis. Figures 17 to 20 shows that participation of insurance and pension funds in other developed countries has been broadly stable. However, in France and the UK the weight of insurance and pension funds in debt financing diminished significantly over the last decade. Interestingly, in emerging economies participation of pension and insurance funds has approached the levels observed in developed economies.

Econometric Analysis. Results in Table 7 show that in general holdings of pension funds and insurance companies are associated with rising public debt. In Emerging Economies higher participation of pension and insurance funds was associated with weaker credit growth and lower credit ratings prior to 2007, while during the crisis these investors withdrew from domestic bond markets under higher risk aversion.

vi. Domestic Investment Funds

Graphical Analysis. Figures 20 to 23 show that domestic investment funds represent the smallest fraction of demand for government debt, usually below 10%. In Core and Peripheral Eurozone countries investment funds significantly reduced their exposure to domestic government which is consistent with findings of Santis and Gerard (2006) who

argued that since the creation of the monetary zone European investment funds diversified their assets across the region.

Econometric Analysis. Regression results in Table 8 show that in general investment funds' demand for domestic bonds increases in countries with rising public debt and falling bond yields. Also, during the crisis era in Safe Haven countries domestic investment funds purchased domestic sovereign bonds under high risk aversion which confirms the status of refuge asset. In turn, investment vehicles in emerging economies sell bonds under rising risk aversion, presumably in fear of falling prices of EM assets. These findings confirm that investment funds are return seekers that react to waves of global risk aversion.

V.4. Relation between Yields and Holdings

i. Relation between sovereign yields and bond holdings in cross-country setting

The relation between government bond yields and debtholdings is investigated empirically according to the specification presented in Equation 6. I consider several constellations concerning foreign holdings, split by country groups and method of estimation. As far as foreign holdings are concerned, I conduct econometric tests first using data on aggregate foreign holdings and subsequently using distinct series for foreign private and foreign official holders. Moreover, I conduct separate tests for developed markets (DM) and emerging markets (EM) assuming that demand for respectively 'risk-free' debt may differ from the demand for 'risky' debt. Finally, as explained earlier, each estimation is conducted twice, once with regular OLS fixed-effects estimation and once with Arellano-Bond (AB) method. Pre-estimation tests show that bond yields data is stationary, but heteroskedasticity and autocorrelation are present which requires a correction of standard errors in case of the OLS estimation. Results are presented in Tables 9 and 10

Regression results for the full sample in regressions (1) to (4) show that the choice of the estimation method alters the significance of results. OLS estimation shows that greater share of non-resident holdings significantly increases bond yields, while greater share of debt held by domestic banks is associated with lower yields. In turn, results from AB estimation are non-significant for all types of holdings.

Split into developed and emerging economies presented in Regressions (5) to (12) reveals diverging mechanisms between yields and holdings. In advanced economies, non-resident holdings are associated with significantly higher yields according according to OLS

estimates. In case of Emerging Economies both OLS and AB regression estimates are statistically significant and point towards a negative relation between bond yields and foreign holdings. Coefficients estimates for all other indicators have similar signs.

Regression results included in Table 10 suggest that using first difference, i.e. change in yields, is not significantly related to the change in demand for government debt.

ii. Relation between sovereign yields and bond holdings for individual countries

Tables 11 and 12 present regression results based on Equation 7 where countries dummies are combined with holdings data to estimate the relation between bonds and holdings for individual countries while keeping the broadest possible setting. Although relatively few results are statistically significant, several interesting patterns emerge with regard to different country types.

Results shows that in Greece and Ireland higher share of foreign private investors is significantly associated with higher yields, which indicates that the outflow of foreign capital from those bond markets was associated with the rise in bond yields. In case of Spain similar pattern appears with regard to foreign official investors. Econometric results in Table 12 present a mixed and blurred picture for Emerging Economies; only in Hungary and Brazil demand factors appear to be related significantly related to bond yields.

Despite the general lack of statistical significance, it is noteworthy that in the US the higher share of foreign private and official holders is associated with lower Treasury yields, which is consistent with the hypothesis of Bernanke (2005) and Caballero, Farhi, and Gourinchas (2008). It is also surprising that in most developed and emerging countries bond yields are lower in countries with a higher share of debt held by domestic investment funds.

Country-specific OLS regressions based on Equation 8 presented in Tables 13 to 16 reveal several interesting relations. Although these results need to be considered with caution as the number of observations is relatively low. In the developed markets demand from domestic banks appears to significantly influence bond yields in the UK, US, France and Spain. Foreign holdings are statistically associated with yields only in the case of Spain. As for Emerging Economies, link between yields and holdings of foreign investors and domestic pension funds are statistically significant for Mexico, Brazil, Hungary and Poland. Last but not least, it is noteworthy that in the UK, France, Netherlands, Ireland, Spain Mexico,

Hungary and Poland the inclusion of holdings data considerably improved the model fit, expressed as R^2, although further research and higher frequency data is necessary to establish whether bondholdings factors improve comprehension of bond yield mechanics.

To conclude, at this level of data granularity it is difficult to pin down a universal relation between yields and bondholdings and this link appears to differ from country to country.

VI. Conclusions

Building on a new broad dataset, this study aims to explain what factors drive demand for government bonds among different investor groups, namely private and official non-residents, domestic banks, domestic pension funds and insurance companies and domestic investment and mutual funds. Econometric results show that in most countries demand from foreign private investors, non-domestic central banks and domestic banks is relatively disconnected from macroeconomic variables and driven mainly by yields, fiscal situation, global market sentiment and policy uncertainty. The reverse relationship between yields and demand for government debt is difficult to establish and appears to differ from country to country.

While the global amount of outstanding government debt more than tripled between 2001 and 2011, the share of foreign holdings across countries increased from 20% to 28% indicating that rising indebtedness might be coupled with spreading financial globalization. Interestingly, foreign central banks have been purchasing government bonds at a greater pace than foreign private investors and at the end of 2011 central banks' holdings were only slightly below the stocks of foreign private investors.

Investor structure varies strongly across countries. While foreign investors hold between 40% and 90% of government debt issued by Eurozone countries with Germany, France and Netherlands being most exposed to external demand, 90% of Japanese and 70% of US, UK and Danish debt is held domestically. Also, the share of foreign investors holding emerging market debt has been consistently rising and reached record levels in May 2013.

Econometric findings indicate that prior to the crisis that international private investors, banks and investment funds behaved as return seekers that purchase government bonds when bond prices increase. Not surprisingly, perception of credit risk by international investors evolved over time. Prior to the crisis private international investors were purchasing bonds of countries with higher growth, rising public indebtedness and higher yields. However, from 2007 onwards international private flows were directed to countries with lower yields. As a result, private inflows are significantly associated to depressing sovereign yields in some

countries while outflows are associated with increasing yields in others. As for foreign central banks, they tend to purchase bonds with low yields and better credit ratings, and sell when under rising spreads or rating downgrades.

As for fiscal and macroeconomic fundamentals, demand from domestic investors are significantly associated with rising public indebtedness and appears to be decoupled from the credit or business cycles. Before 2008, countries experiencing rising public indebtedness, in particular Greece and Spain, attracted inflows of international private investors while official sector investors withdrew funds from those countries. After the crisis purchases by both types of investors appear to be associated with credit growth rather than public indebtedness.

In terms of sensitivity to global risk aversion, I find that results differ strongly between country groups. Among domestic investors, investment funds in Safe Haven countries tend to purchase domestic bonds when uncertainty rises, while rising risk pushes asset managers in Emerging Economies tend to sell domestic bonds. As for private non-resident investors, results for the crisis period indicate that under high global risk aversion they sell bonds of Peripheral Eurozone and Emerging Markets and purchase debt of Core Eurozone countries. However, I find no evidence for flight-to-safety effects in Safe Haven countries. What is surprising is that bond purchases by foreign central banks have also been associated with global risk sentiment. As financial crisis escalated foreign central banks sold bonds of peripheral countries and began to buy Safe Haven and Core Eurozone. In the result, in 2011 foreign central banks were holding over 40% of government debt of France and Germany.

Last but not least, this article analyses demand for government debt by different investor types as potential determinants of government bond yields. Econometric findings indicate that greater foreign demand for local currency government debt tends to significantly lower sovereign bond yields in Emerging Economies. Empirical investigation for individual countries reveals that demand by foreign investors is significantly associated with government yields in Greece, Ireland and Spain as well as Brazil, Mexico, Hungary and Poland.

Academic research encompassing domestic and foreign demand for government debt has been very limited until now leaving broad scope for further research. Potential research direction could focus on cross-country linkages on different investor groups in countries with different degree of financial integration, for instance impact of the Eurozone crisis on holdings in emerging market economies. Further unexplored fields include the short-term causality between credit risk, yields and investor classes seen at different levels of maturity.

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Tables

Table 1.A Data Availability and Sources

Region	Country	Frequency	Data Availability	Distinction for Maturity	rm and Valuati	Coverage	Source
Eurozone Core	France	Monthly	10/1999 - 06/2013	Only government and central bank bonds	Stocks, N/A	N/A	Agence France Tresor. Monthly Bulletin.
	Germany	Quarterly	12/1999 - 03/2013	Bills and bonds	Stocks, nomina	Central Government	I. Courtesy of Bundesbank. Department of "Bankenstatistik und andere Finanzstatistiken" II. Alternative, less detailed dataset with longer history of general government debt: Bundesbank. Statistics. Time series. Public finances. Sovereign debt developments. Creditors. III. Bundesbank Depot Statistik - Verschuldung des Bundes for data starting before 2005
	Netherlands	Quarterly	12/1999 - 03/2012	Bills and bonds	Stocks, nomina	Central Government	Courtesy of Balance of Payments Department of the Dutch National Bank
Eurozone Periphery	Greece	Quarterly	12/1997 - 03/2013	Bills and bonds	Stocks, nomina	Central Government	Bank of Greece. Statistics. Financial Accounts. Central Government. Quarterly Data
	Ireland	Monthly	09/2001 - 12/2012	Only government and central bank bonds	Stocks, nomina	Central Government	Central Bank of Ireland. Securities Statistics
	Italy	Monthly	01/1997 - 02/2013	1. Bills, 2. Bonds, 3. Zero Coupon Bonds, 4. Variable rate treasury credit certificates	Stocks, market	Central Government	Base informative pubblica. Supplements to the statistical bulletin. I. The Public Finances. Borrowing Requirement and Debt. General Government Debt. By residual maturity II. The Financial Market. Securities: stocks by groups of investors. Table TDEE0060.
	Portugal	Quarterly	12/2007 - 04/2012	Bills and bonds	Stocks, market	Central Government	Bank of Portugal. Statistical Bulletin. Statistics. Statistical publications. Statistical Bulletin. Publications Document List. Chapter K
	Spain	Monthly	12/1996 - 12/2012	Bills and bonds	Stocks, nomina	N/A	1) Banco de Espana Statistics. Boletín Estadístico. Chapter 22: Mercados secundarios de valores 2) Tesoro Publico. Boletín de Estadisticas.
Safe Havens	Japan	Quarterly	12/1997 - 12/2012	Bills and bonds	Stocks, market	Central Government	Bank of Japan. Time Series Data Search. Flow of Funds. Data Selection By List of Series. Flow of Funds. Financial Assets and Liabilities
	UK	Quarterly	03/1987 - 03/2013	Bills and bonds	No information	Tradable Government Securities	1) UK Debt Management Office. Gilt Market Data. Data on average maturity and duration available as "gross" debt and "net" debt from 2004 and 2005 respectively. 2) Office for National Statistics. Courtesy.
	US	Quarterly	03/2001 - 12/2012	Total marketable debt	Stocks, nominal value	Central Government	I. The Bureau of the United States Department of Treasury. Treasury Bulletin. Ownership of Federal Securities II. Federal Reserve Bank of St. Louis. Fred Economic Data. Money, Banking, & Finance. Monetary Data. Securities, Loans, & Other Assets & Liabilities Held by Fed . U.S. Treasury securities held by the Federal Reserve: All Maturities
Developed Economies	Denmark	Monthly	12/1999 - 06/2013	Bills and bonds	Stocks, nominal value	Federal Government	Central Bank. Securities Statistics. DNVPDKS: VP-registered securities by issuer and investors sector.
	Iceland	Monthly	02/2009 - 06/2012	1. Bills and bonds 2. By instrument, i.e. year of maturity	Stocks, N/A	N/A	Government Debt Management. Market Information. Monthly Reports
	Israel	Monthly	01/2006 - 12/2012	Bills and bonds	Stocks, nominal value	Central Government	Bank of Israel. Publications. Annual Reports. Bank of Israel Annual Report - by year

Table 1.B Data Availability and Sources

Region	Country	Frequency	Data Availability	Distinction for Maturity	rm and Valuati	Coverage	Source
Emerging Asia	India	Quarterly	03/2007 - 12/2012	Total marketable debt	Stocks, nominal value	Federal Government	Reserve Bank of India. Database on Indian Economy. Statistics. Financial Market. Government Securities Market. Ownership Pattern of Government of India Dated Securities
	Indonesia	Monthly	05/1999 - 03/2013	Total marketable debt	Stocks, market value	Central Government	1. Bank of Indonesia. Statistics. Indonesian Financial Statistics. Government Finance Sector. Outstanding of Government Securities 2. Directorate General of Debt Management. Statistics. Ownership of Tradeable Government Securities
	Malaysia	Quarterly	03/1996 - 03/2013	Bills and bonds	N/A	N/A	Central Bank of Malaysia. Publications & Research Paper. Periodicals. Monthly Statistical Bulletin. Table 3.1.5 Federal Government Domestic Debt: Classification by Holder
	Thailand	Monthly	01/2003 - 04/2013	Bills and bonds	Stocks, nominal value	Federal Government	I. Bank of Thailand. Statistics. Financial Markets. Debt Securities - series from 2009 onwards II. Datastream based on Bank of Thailand
Emerging Europe	Bulgaria	Quarterly	06/2002 - 03/2012	Total marketable debt	Stocks, nominal value	Central Government	Bulgarian National Bank. Research and Publications. BNB Periodical Publications. Government Securities Market
	Czech Republic	Monthly	12/1996 - 03/2013	1. Bills and bonds 2. By maturity: T-bills to 50y bonds	Stocks, nominal value	Central Government	Ministry of Finance. State Debt. Debt Statistics. Treasury Securities by Type of Holder.
	Hungary	Quarterly	12/1997 - 12/2012	Bills and bonds	Stocks, N/A	Federal Government	I. Government Debt Management Agency. Publication, Statistics. Statistics. Ownership structure of government securities II. Hungarian Central Bank. Statistics. Statistical Data and Information. Statistical Time Series. Table XIII: Securities Data on securities issued by Hungarian residents with breakdown by issuer and holding sectors
	Latvia	Monthly	07/1996 - 12/2009	Bills and bonds	Stocks, nominal value	Central Government	Courtesy of the Monetary Policy Department of the Bank of Latvia
	Poland	Monthly	01/1996 - 06/2013	1. Bills and bonds 2. By instrument, i.e. year of maturity	Stocks, market value	Central Government	Ministry of Finance. Public Debt. Publications. 1) Investors. Secondary Market. Nominal T-bonds and T-bills outstanding 2) State Treasury Debt
	Turkey	Monthly	01/2006 - 05/2013	Total marketable debt	Stocks, nominal value	Central Government	Republic of Turkey Prime Ministry Undersecretariat of Treasury. Statistics. Public Finance. Central Government Domestic Debt Statistics. Composition of Domestic Debt Stock by Holders.
Emerging Latin America	Brazil	Monthly	01/2007 - 05/2013	Total marketable debt	Stocks, nominal value	Central Government	I. Tesouro Nacional. Public Debt. Federal Public Debt Monthly Report.
	Mexico	Monthly	01/1999 - 06/2013	Bills and bonds	Stocks, nominal value	Central Government	Banco de Mexico. Statistics. 1) Financial system. Financial markets. Debt outstanding. 2) Public Finances. Average Maturity of Government Securities.
	Peru	Monthly	11/2003 - 11/2011	By instrument, i.e. year of maturity	Stocks, nominal value	Central Government	Courtesy of Dirección General de Endeudamiento y Tesoro Público de la República del Perú
	South Africa	Monthly	01/2006 - 06/2011	Bills, short-term bonds, long-term bonds	Stocks, market value	Central Government	Reserve Bank of South Africa. Publications. Publications and Noties. Statistical Tables. Ownership distribution of domestic marketable debt.

Table 2: Investor Structure per country as of December 2011

	Private Non-residents	Official Non-residents	Banks	Pension and Insurance Funds	Investment Funds	General Government	Domestic Central Bank
Emerging Economies							
Brazil	12%	0%	33%	20%	26%	9%	0%
Bulgaria	1%	0%	55%	22%	22%	0%	0%
Czech Republic	14%	0%	42%	26%	3%	8%	2%
Hungary	35%	0%	32%	16%	5%	1%	2%
Iceland	24%	0%	35%	21%	13%	0%	0%
India	1%	0%	42%	24%	11%	8%	14%
Indonesia	33%	0%	40%	19%	7%	0%	1%
Israel	10%	0%	22%	46%	16%	0%	5%
Latvia	0%	0%	0%	0%	0%	0%	0%
Malaysia	38%	0%	15%	42%	0%	4%	1%
Mexico	36%	0%	13%	34%	17%	0%	0%
Peru	46%	0%	11%	39%	2%	3%	0%
Poland	31%	0%	23%	37%	7%	0%	0%
South Africa	0%	0%	54%	44%	0%	0%	2%
Thailand	15%	0%	20%	34%	0%	17%	10%
Turkey	17%	0%	57%	0%	4%	0%	2%
Eurozone Core							
France	28%	30%	14%	22%	2%	0%	0%
Germany	59%	31%	2%	1%	5%	0%	0%
Netherlands	35%	30%	9%	22%	3%	0%	0%
Eurozone Periphery							
Greece	62%	0%	24%	0%	0%	10%	0%
Ireland	34%	7%	18%	1%	1%	1%	33%
Italy	53%	3%	22%	0%	5%	0%	16%
Portugal	54%	6%	0%	0%	0%	0%	40%
Spain	40%	5%	12%	10%	6%	12%	10%
Safe Havens							
Denmark	36%	0%	12%	40%	0%	11%	0%
Japan	7%	2%	45%	24%	4%	3%	11%
UK	21%	11%	10%	24%	9%	0%	21%
US	12%	23%	2%	7%	6%	38%	12%

Note: Data as of 2011 for all countries except of France and Latvia where it is reported as of 2010. Data has been collected from national sources except for official non-resident holdings that have been extracted from the IMF CPIS database. Central Bank for Eurozone countries stand for ECB holdings following the SMP programme.

Table 3.A Determinants of Demand for Government Bonds by Different Foreign Investors Pre- and Post-Crisis

Dependent Variable	Foreign Private				Foreign Official			
Time period	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Regression Number	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Change in Public Debt/GDP	1.88***	-0.03	1.91***	0.21	-2.61*	-0.05	-2.70*	-0.17
	(0.66)	(0.39)	(0.67)	(0.39)	(1.41)	(0.21)	(1.35)	(0.19)
Change in Private Debt/GDP	-0.19	0.18***	-0.25	0.16**	-0.04	-0.42***	0.01	-0.41***
	(0.36)	(0.06)	(0.35)	(0.06)	(0.66)	(0.09)	(0.67)	(0.10)
Growth Trend	1.14*	0.76**	1.09*	0.71**	-0.81	0.54**	-0.70	0.51**
	(0.60)	(0.27)	(0.62)	(0.26)	(0.48)	(0.21)	(0.42)	(0.23)
Risk Aversion Index	-0.04**	-0.06***	-0.04*	-0.06***	-0.06	0.03***	-0.06	0.03***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.06)	(0.01)	(0.06)	(0.01)
Level of Sovereign Yield	0.01**	-0.01**			-0.01	-0.01*		
	(0.00)	(0.00)			(0.01)	(0.00)		
Change in Sovereign Yield			0.02	-0.02**			-0.09*	0.01
			(0.06)	(0.01)			(0.05)	(0.02)
R-squared	0.03	0.10	0.03	0.10	0.04	0.37	0.05	0.33
Nb of Observations	482	417	479	417	319	228	319	228
Nb of Countries	25	27	25	27	15	15	15	15

Standard errors in parentheses, significance levels: * p<.10,** p<.05,*** p<.01, Panel OLS Regression with Driscoll Kraay SE, Pre-crisis 2001Q1 to 2006Q4, Post-crisis 2007Q1 to 2011Q4

Note: 1. Dependent variable, i.e. bond holdings, as well as public and private debt to GDP are used in first difference. 2. GDP Growth is detrended using HP Filter. 3. Risk Aversion is proxied using

Table 3.B Determinants of Demand for Government Bonds by Different Domestic Investors Pre- and Post-Crisis

Dependent Variable	Banks				Pension & Insurance				Investment Funds			
Time period	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Regression Number	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Change in Public	2.31***	2.27***	2.24***	2.46***	0.77***	0.86*	0.79***	0.92**	1.42**	2.28	1.42**	2.48*
Debt / GDP	(0.54)	(0.65)	(0.51)	(0.67)	(0.20)	(0.45)	(0.20)	(0.42)	(0.61)	(1.33)	(0.61)	(1.26)
Change in Private	0.11	0.18	0.08	0.16	-0.07	0.11	-0.09	0.10	-0.22	0.03	-0.20	-0.01
Debt / GDP	(0.16)	(0.15)	(0.16)	(0.15)	(0.06)	(0.09)	(0.07)	(0.09)	(0.23)	(0.14)	(0.23)	(0.15)
Growth Trend	0.28	0.02	0.25	-0.02	0.49**	-0.41	0.47*	-0.36	0.18	0.13	0.17	0.31
	(0.23)	(0.32)	(0.24)	(0.32)	(0.24)	(0.24)	(0.24)	(0.25)	(0.31)	(0.42)	(0.26)	(0.39)
Risk Aversion Index	-0.00	0.02	-0.00	0.02	0.00	0.01	0.00	0.01	0.02	-0.01	0.02	-0.00
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
Level of Sovereign	0.00	-0.00*			0.00***	0.00			0.00	0.00		
Yield	(0.00)	(0.00)			(0.00)	(0.00)			(0.00)	(0.00)		
Change in Sovereign			0.00	-0.02***			0.00	-0.01			-0.04***	-0.05***
Yield			(0.01)	(0.01)			(0.01)	(0.01)			(0.01)	(0.01)
R-squared	0.05	0.08	0.04	0.09	0.06	0.05	0.04	0.05	0.03	0.05	0.05	0.08
Nb of Observations	484	401	481	401	378	342	376	342	325	326	323	326
Nb of Countries	25	26	25	26	20	22	20	22	19	21	19	21

Standard errors in parentheses, significance levels: * p<.10,** p<.05,*** p<.01, Panel OLS Regression with Driscoll Kraay SE, Pre-crisis 2001Q1 to 2006Q4, Post-crisis 2007Q1 to 2011Q4

Note: 1. Dependent variable, i.e. bond holdings, as well as public and private debt to GDP are used in first difference, 2. GDP Growth is detrended using HP Filter, 3. Risk Aversion is proxied using Citi Global Risk Aversion Macro Index where rising index values indicate higher aversion to risky assets, 4. For US, Japan and Germany I use 10-year bond yields, for the Eurozone I calculate spread over German Bunds, and in EMs I use the yield differential between local yield and average yield on UST, Bunds and JGBs

Table 4.A Determinants of Demand for Government Bonds by Private Non-resident Investors Types Pre- and Post-Crisis

Scope of Analysis	All Countries								Safe Havens		Emerging Economies			
Time period	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Regression Number	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Change in Public Debt / GDP	1.88***	-0.03	1.91***	0.21	1.92***	-0.08	1.81**	0.23	1.70**	1.08				
	(0.66)	(0.39)	(0.67)	(0.39)	(0.66)	(0.40)	(0.76)	(0.39)	(0.70)	(0.76)				
Change in Private Debt / GDP	-0.19	0.18***	-0.25	0.16**	-0.12	0.18***	-0.28	0.22***						
	(0.36)	(0.06)	(0.35)	(0.06)	(0.35)	(0.06)	(0.36)	(0.07)						
Growth Trend	1.14*	0.76**	1.09*	0.71**	0.43	0.78**	1.15*	0.53*	3.00**	0.98				
	(0.60)	(0.27)	(0.62)	(0.26)	(0.58)	(0.27)	(0.58)	(0.29)	(1.15)	(0.61)				
Risk Aversion Index	-0.04**	-0.06***	-0.04*	-0.06***	-0.04**	-0.06***	-0.05**	-0.06***			-0.01	-0.10***	-0.01	-0.12**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)			(0.05)	(0.03)	(0.05)	(0.04)
Level of Sovereign Yield	0.01**	-0.01**												
	(0.00)	(0.00)												
Change in Sovereign Yield			0.02	-0.02**										
			(0.06)	(0.01)										
Credit Rating					-0.22*	0.06								
					(0.12)	(0.07)								
Change in Political Risk							-0.00	-0.01**			-0.01	-0.03**		
							(0.00)	(0.01)			(0.01)	(0.01)		
Financial Openness													0.02	-0.23***
													(0.12)	(0.06)
R-squared	0.03	0.10	0.03	0.10	0.04	0.09	0.02	0.11	0.05	0.07	0.00	0.19	0.00	0.20
Nb of Observations	482	417	479	417	493	417	469	390	111	64	240	200	240	104
Nb of Countries	25	27	25	27	25	27	24	25	4	4	13	13	13	13

Standard errors in parentheses, significance levels: * p<.10,** p<.05,*** p<.01, Panel OLS Regression with Driscoll Kraay SE, Pre-crisis 2001Q1 to 2006Q4, Post-crisis 2007Q1 to 2011Q4

Note: 1. Dependent variable, i.e. bond holdings, as well as public and private debt to GDP are used in first difference, 2. GDP Growth is detrended using HP Filter, 3. Risk Aversion is proxied using Citi Global Risk Aversion Macro Index where rising index values indicate higher aversion to risky assets, 4. For US, Japan and Germany I use 10-year bond yields, for the Eurozone I calculate spread over German Bunds, and in EMs I use the yield differential between local yield and average yield on UST, Bunds and JGBs

Table 4.B Determinants of Demand for Government Bonds by Private Non-resident Investors Types Pre- and Post-Crisis

Scope of Analysis	Core Eurozone						Peripheral Eurozone			
Time period	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Regression Number	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Change in Public Debt / GDP	1.30	1.98*	1.84	2.22*	1.82	2.19*	1.73*	1.20**	1.58	1.05**
	(1.75)	(1.12)	(1.37)	(1.19)	(1.32)	(1.16)	(0.98)	(0.43)	(1.03)	(0.43)
Private Debt	0.18	0.26***	0.04	0.23**	0.08	0.23**				
	(0.46)	(0.09)	(0.40)	(0.09)	(0.40)	(0.09)				
Risk Aversion Index	-0.08	0.02*					0.02	-0.02*	0.01	-0.03**
	(0.08)	(0.01)					(0.04)	(0.01)	(0.03)	(0.01)
Level of Sovereign Yield			-0.00	0.01*			-0.09	-0.02***		
			(0.01)	(0.01)			(0.11)	(0.00)		
Credit Rating					0.03	-0.03*			-0.07	0.44***
					(0.03)	(0.01)			(0.14)	(0.06)
R-squared	0.07	0.40	0.01	0.41	0.01	0.38	0.07	0.42	0.06	0.48
Nb of Observations	63	48	63	48	63	48	109	80	109	80
Nb of Countries	3	3	3	3	3	3	4	5	4	5

Standard errors in parentheses, significance levels: * p<.10,** p<.05,*** p<.01, Panel OLS Regression with Driscoll Kraay SE, Pre-crisis 2001Q1 to 2006Q4, Post-crisis 2007Q1 to 2011Q4

Note: 1. Dependent variable, i.e. bond holdings, as well as public and private debt to GDP are used in first difference, 2. GDP Growth is detrended using HP Filter, 3. Risk Aversion is proxied using Citi Global Risk Aversion Macro Index where rising index values indicate higher aversion to risky assets, 4. For US, Japan and Germany I use 10-year bond yields, for the Eurozone I calculate spread over German Bunds, and in EMs I use the yield differential between local yield and average yield on UST, Bunds and JGBs

Table 5.A Determinants of Demand for Government Bonds by Foreign Central Banks Pre- and Post-Crisis

Scope of Analysis	All Countries							
Time period	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Regression Number	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Level of Public Debt / GDP	-0.03	-0.04***	-0.06	-0.01	-0.03	-0.02*	-0.02	-0.04***
	(0.03)	(0.01)	(0.06)	(0.01)	(0.04)	(0.01)	(0.03)	(0.01)
Credit Growth	0.08	-0.42***	0.08	-0.42***	0.05	-0.39***	0.07	-0.40***
	(0.75)	(0.09)	(0.76)	(0.08)	(0.68)	(0.08)	(0.76)	(0.10)
Growth Trend	-0.23	0.49*	-0.33	0.33	-0.31	0.19	-0.28	0.51
	(0.38)	(0.27)	(0.50)	(0.32)	(0.65)	(0.28)	(0.35)	(0.33)
Risk Aversion Index	-0.05	0.02***	-0.05	0.03***	-0.05	0.02***	-0.05	0.03***
	(0.07)	(0.01)	(0.07)	(0.01)	(0.06)	(0.01)	(0.07)	(0.01)
Level of Sovereign Yield	-0.00	-0.01**						
	(0.01)	(0.01)						
Credit Rating(-1)			-0.25	0.35**				
			(0.46)	(0.14)				
Political Risk					0.00	-0.00**		
					(0.00)	(0.00)		
Current Acc Bal							-0.24*	0.24
							(0.13)	(0.14)
R-squared	0.01	0.44	0.01	0.46	0.02	0.43	0.01	0.39
Nb of Observations	291	188	291	188	270	176	291	188
Nb of Countries	12	12	12	12	11	11	12	12

Standard errors in parentheses, significance levels: * p<.10,** p<.05,*** p<.01, Panel OLS Regression with Driscoll Kraay SE, Pre-crisis 2001Q1 to 2006Q4, Post-crisis 2007Q1 to 2011Q4. Note: 1. Dependent variable, i.e. bond holdings, as well as public and private debt to GDP are used in first difference, 2. GDP Growth is detrended using HP Filter, 3. Risk Aversion is proxied using Citi Global Risk Aversion Macro Index where rising index values indicate higher aversion to risky assets

Table 5.B Determinants of Demand for Government Bonds by Foreign Central Banks Pre- and Post-Crisis

Scope of	Safe Havens						Core Eurozone						Peripheral	
Time period		Post		Post	Pre	Post						Post	Pre	Post
Regression	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)			(12)	(13)	(14)
Public Debt / GDP							-2.62	0.84***	-2.50	0.82***	-2.75	0.70***	-4.89	-0.93**
							(2.12	(0.24	(2.22	(0.16	(2.30	(0.23)	(2.95)	(0.38)
Credit Growth	-0.12	-0.39***	-0.12	-0.40***	-0.15	-0.39***	-0.19	-0.51***	-0.12	-	-0.19	-0.52***		-0.33**
	(0.27	(0.06)	(0.30	(0.07)	(0.28)	(0.07)	(0.81	(0.05	(0.82	(0.03	(0.82	(0.05)		(0.15)
Growth Trend							-1.02		1.33	0.28	-1.06		-1.33*	
							(3.15	(0.36	(4.54	(0.37	(3.11	(0.37)	(0.77)	
Risk Aversion Index	-0.02		-0.02		-0.02									0.06***
	(0.03	(0.01)	(0.03	(0.01)	(0.03)	(0.01)								(0.01)
Level of Sovereign			-0.03						-7.92	2.30***				
Yield			(0.60	(0.58)					(8.30	(0.63				
Current Acc Bal					-	0.01					-0.16	-0.44***		
					(0.20)	(0.24)					(0.43	(0.13)		
R-squared		0.39		0.47	0.03	0.39						0.69	0.07	0.37
Nb of	95	64	95	64	95	64	75	48	75	48	75	48	125	76
Nb of Countries	4	4	4	4	4	4	3	3	3	3	3	3	5	5

Standard errors in parentheses, significance levels: * p<.10,** p<.05,*** p<.01, Panel OLS Regression with Driscoll Kraay SE, Pre-crisis 2001Q1 to 2006Q4, Post-crisis 2007Q1 to 2011Q4

Note: 1. Dependent variable, i.e. bond holdings, as well as public and private debt to GDP are used in first difference, 2. GDP Growth is detrended using HP Filter, 3. Risk Aversion is proxied using Citi Global Risk Aversion Macro Index where rising index values indicate higher aversion to risky assets, 4. For US, Japan and Germany I use 10-year bond yields, for the Eurozone I calculate spread over German Bunds, and in EMs I use the yield differential between local yield and average yield on UST, Bunds and JGBs

Table 6.A Determinants of Demand for Government Bonds by Domestic Banks Pre- and Post-Crisis

Scope of Analysis	All Countries											
Time period	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Regression Number	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Change in Public Debt / GDP	1.84***	2.37***	2.13***	2.42***	2.04***	2.63***	2.08***	2.26***	2.16***	2.75***	1.91***	3.12**
	(0.45)	(0.65)	(0.48)	(0.66)	(0.46)	(0.66)	(0.46)	(0.67)	(0.48)	(0.79)	(0.44)	(1.01)
Level of Sovereign Yield			0.00*	-0.00*								
			(0.00)	(0.00)								
Change in Sovereign Yield					0.00	-0.02***						
					(0.01)	(0.01)						
Credit Rating							-0.11**	0.06				
							(0.04)	(0.05)				
Political Risk									0.00**	0.00		
									(0.00)	(0.00)		
Financial Openness											-0.06***	0.01
											(0.02)	(0.06)
R-squared	0.03	0.07	0.05	0.07	0.04	0.08	0.05	0.07	0.05	0.09	0.04	0.10
Nb of Observations	545	419	514	403	509	403	545	419	517	392	518	203
Nb of Countries	26	27	25	26	25	26	26	27	25	25	25	26

Standard errors in parentheses, significance levels: * p<.10,** p<.05,*** p<.01, Panel OLS Regression with Driscoll Kraay SE, Pre-crisis 2001Q1 to 2006Q4, Post-crisis 2007Q1 to 2011Q4

Note: 1. Dependent variable, i.e. bond holdings, as well as public and private debt to GDP are used in first difference, 2. GDP Growth is detrended using HP Filter, 3. Risk Aversion is proxied using Citi Global Risk Aversion Macro Index where rising index values indicate higher aversion to risky assets, 4. For US, Japan and Germany I use 10-year bond yields, for the Eurozone I calculate spread over German Bunds, and in EMs I use the yield differential between local yield and average yield on UST, Bunds and JGBs

Table 6.B Determinants of Demand for Government Bonds by Domestic Banks Pre- and Post-Crisis

Scope of Analysis	Safe Havens		Core Eurozone				Peripheral Eurozone						Emerging Econ	
Time period	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Regression Number	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Change in Public Debt / GDP	2.05**	3.14***	2.38***	3.02	2.30**	4.06**	2.28**	2.01	2.23**	2.34	2.09**	1.88	1.78***	2.37*
	(0.85)	(0.77)	(0.85)	(1.82)	(0.92)	(1.72)	(1.07)	(1.42)	(0.97)	(1.46)	(0.93)	(1.26)	(0.45)	(1.18)
Risk Aversion Index											-0.05*	0.08	0.01	0.03*
											(0.03)	(0.06)	(0.01)	(0.02)
Credit Rating	-0.06	1.12*							-0.02	0.42*				
	(0.49)	(0.53)							(0.21)	(0.21)				
Change in Sovereign Yield			0.05	0.19*			-0.11	-0.03**					-0.00	-0.01**
			(0.08)	(0.10)			(0.17)	(0.01)					(0.01)	(0.01)
R-squared	0.05	0.10	0.03	0.19	0.02	0.25	0.05	0.06	0.05	0.12	0.06	0.09	0.04	0.11
Nb of Observations	111	64	63	48	63	48	109	64	109	64	109	64	221	200
Nb of Countries	4	4	3	3	3	3	4	4	4	4	4	4	13	13

Standard errors in parentheses, significance levels: * p<.10,** p<.05,*** p<.01, Panel OLS Regression with Driscoll Kraay SE, Pre-crisis 2001Q1 to 2006Q4, Post-crisis 2007Q1 to 2011Q4

Note: 1. Dependent variable, i.e. bond holdings, as well as public and private debt to GDP are used in first difference, 2. GDP Growth is detrended using HP Filter, 3. Risk Aversion is proxied using Citi Global Risk Aversion Macro Index where rising index values indicate higher aversion to risky assets, 4. For US, Japan and Germany I use 10-year bond yields, for the Eurozone I calculate spread over German Bunds, and in EMs I use the yield differential between local yield and average yield on UST, Bunds and JGBs

Table 7 Determinants of Demand for Government Bonds by Domestic Pension and Insurance Funds Pre- and Post-Crisis

Scope of Analysis	All Countries		Core Eurozone				Emerging Economies			
Time period	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Regression Number	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Change in Public Debt /	0.58**	1.07**	1.23*	0.57	1.28*	0.52				
GDP	(0.27)	(0.40)	(0.63)	(0.54)	(0.68)	(0.62)				
Credit Growth	-0.04***	0.00	0.00	0.06*	-0.01	-0.03	-0.04**	-0.01	-0.03*	-0.01
	(0.01)	(0.01)	(0.02)	(0.03)	(0.03)	(0.05)	(0.02)	(0.02)	(0.01)	(0.02)
Growth Trend	1.54**	-0.33								
	(0.60)	(0.74)								
Credit Rating			-0.02	-0.06					-0.17*	0.04
			(0.04)	(0.05)					(0.09)	(0.07)
Political Risk					0.00	0.02**	0.00***	0.00		
					(0.00)	(0.01)	(0.00)	(0.00)		
Risk Aversion							-0.00	-0.02*	-0.00	-0.02**
							(0.01)	(0.01)	(0.01)	(0.01)
R-squared	0.09	0.04	0.02	0.06	0.03	0.17	0.11	0.03	0.07	0.02
Nb of Observations	405	358	63	48	63	48	171	173	171	173
Nb of Countries	21	23	3	3	3	3	10	11	10	11

Standard errors in parentheses, significance levels: * p<.10,** p<.05,*** p<.01, Panel OLS Regression with Driscoll Kraay SE, Pre-crisis 2001Q1 to 2006Q4, Post-crisis 2007Q1 to 2011Q4

Note: 1. Dependent variable, i.e. bond holdings, as well as public and private debt to GDP are used in first difference, 2. GDP Growth is detrended using HP Filter, 3. Risk Aversion is proxied using Citi Global Risk Aversion Macro Index where rising index values indicate higher aversion to risky assets, 4. For US, Japan and Germany I use 10-year bond yields, for the Eurozone I calculate spread over German Bunds, and in EMs I use the yield differential between local yield and average yield on UST, Bunds and JGBs

Table 8 Determinants of Demand for Government Bonds by Domestic Investment Funds Pre- and Post-Crisis

Scope of Analysis	All Countries		Safe Havens				Core Eurozone		Emerging Economies					
Time period	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Regression Number	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Change in Public Debt / GDP	1.24*	2.26*	0.86	-0.37	0.84	-0.05	2.84	10.61*	2.34*	0.57	0.96	0.13	1.31	0.40
	(0.62)	(1.20)	(0.83)	(1.05)	(0.81)	(0.91)	(1.83)	(5.46)	(1.20)	(0.92)	(0.96)	(0.97)	(1.12)	(0.96)
Change in Sovereign Yield	-0.04***	-0.05***			-0.08***	-0.17***	-0.00	-0.20**					-0.05**	-0.03*
	(0.01)	(0.02)			(0.03)	(0.03)	(0.06)	(0.07)					(0.02)	(0.02)
Risk Aversion Index			0.02	0.06***					0.02	-0.04**				
			(0.02)	(0.02)					(0.02)	(0.02)				
Level of Sovereign Yield											-0.01*	-0.00		
											(0.00)	(0.00)		
R-squared	0.03	0.07	0.03	0.16	0.07	0.33	0.06	0.37	0.04	0.03	0.04	0.00	0.08	0.02
Nb of Observations	332	328	83	48	83	48	61	48	118	157	104	157	102	157
Nb of Countries	19	21	3	3	3	3	3	3	9	10	9	10	9	10

Standard errors in parentheses, significance levels: * p<.10,** p<.05,*** p<.01, Panel OLS Regression with Driscoll Kraay SE, Pre-crisis 2001Q1 to 2006Q4, Post-crisis 2007Q1 to 2011Q4

Note: 1. Dependent variable, i.e. bond holdings, as well as public and private debt to GDP are used in first difference, 2. GDP Growth is detrended using HP Filter, 3. Risk Aversion is proxied using Citi Global Risk Aversion Macro Index where rising index values indicate higher aversion to risky assets, 4. For US, Japan and Germany I use 10-year bond yields, for the Eurozone I calculate spread over German Bunds, and in EMs I use the yield differential between local yield and average yield on UST, Bunds and JGBs

Table 9: Determinants of Government Bond Yields in Developed and Emerging Markets. Dependent variable: 10-y gov bond yield. Panel OLS Regressions.

	(1) All	(2) All	(3) All	(4) All	(5) DM	(6) DM	(7) DM	(8) DM	(9) EM	(10) EM	(11) EM	(12) EM
Non-resident Total	0.03***	-0.01			0.07***	-0.00			-0.09***	-0.03**		
	(3.37)	(-0.25)			(6.99)	(-0.12)			(-5.15)	(-2.71)		
Non-resident Private			0.02*	-0.04			0.07***	-0.02			-0.09***	-0.03**
			(1.74)	(-1.43)			(5.33)	(-1.15)			(-5.12)	(-3.17)
Non-resident Official			0.04***	-0.00			0.07***	0.01			-0.03	-0.23**
			(3.91)	(-0.14)			(6.76)	(0.34)			(-0.13)	(-2.86)
Banks' Holdings	-0.03**	0.03	-0.04**	0.02	-0.04	0.05	-0.04*	0.06	0.01	0.01	0.01	0.01
	(-2.23)	(1.28)	(-2.53)	(0.83)	(-1.59)	(0.62)	(-1.67)	(0.79)	(0.84)	(0.82)	(0.84)	(0.73)
Change in Public Debt	0.05***	0.03	0.05***	0.05*	0.04*	0.05*	0.04*	0.06**	0.01	0.00	0.01	0.01
	(3.07)	(1.47)	(2.97)	(1.85)	(1.79)	(2.07)	(1.79)	(2.34)	(0.62)	(0.26)	(0.59)	(0.33)
Debt to GDP	-0.04***	0.03	-0.04***	0.02	-0.05***	0.02	-0.05***	0.00	0.00	0.01	0.00	0.01
	(-5.85)	(1.29)	(-5.61)	(1.26)	(-7.22)	(1.51)	(-7.11)	(0.69)	(0.37)	(1.52)	(0.40)	(1.21)
Inflation	0.10***	0.04	0.09**	0.08*	-0.07	0.08	-0.07	0.11	0.08**	0.04	0.08**	0.04
	(2.73)	(1.16)	(2.43)	(1.94)	(-1.30)	(1.25)	(-1.39)	(1.61)	(2.33)	(1.60)	(2.34)	(1.34)
Growth Trend	-0.06***	0.09*	-0.06***	0.03	-0.05**	0.05	-0.05**	-0.01	0.10***	0.04	0.10***	0.05*
	(-2.92)	(1.83)	(-2.72)	(1.38)	(-2.32)	(1.15)	(-2.29)	(-0.56)	(2.61)	(1.83)	(2.62)	(1.90)
Fed Funds Rate	0.00**		0.00*		0.00		0.00		-0.00*		-0.00*	
	(2.37)		(1.89)		(0.57)		(0.46)		(-1.85)		(-1.86)	
Credit Rating	-0.30***		-0.30***		-0.34***		-0.34***		-0.05**		-0.05**	
	(-31.02)		(-31.13)		(-35.22)		(-35.15)		(-2.36)		(-2.32)	
VIX	0.00		0.00		-0.00*		-0.00*		0.00		0.00	
	(1.12)		(0.92)		(-1.67)		(-1.71)		(0.84)		(0.84)	
Oil	-0.00***		-0.00***		-0.00**		-0.00**		0.00		0.00	
	(-2.93)		(-2.79)		(-2.44)		(-2.39)		(1.36)		(1.38)	
Govt Yield 10Y (Lag)		0.69***		0.84***		0.81***		0.92***		0.48***		0.48***
		(5.04)		(9.40)		(8.47)		(15.39)		(8.41)		(8.38)
R-squared	0.72		0.72		0.85		0.85		0.30		0.30	
Nb of Observations	542	523	542	523	323	313	323	313	219	210	219	210
Nb of Countries	18	18	18	18	10	10	10	10	8	8	8	8
Country Fixed Effects	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO

Note: Robust Standard Errors. *t* statistics in parentheses. * p<.10, ** p<.05, *** p<.01

Table 10: Determinants of Changes in Government Bond Yields in Developed and Emerging Markets. Dependent variable: first difference of 10-y gov bond yield. Panel OLS Regressions.

	(1) All	(2) All	(3) All	(4) All	(5) DM	(6) DM	(7) DM	(8) DM	(9) EM	(10) EM	(11) EM	(12) EM
Non-resident Total (1st D)	-0.01	0.02			-0.00	0.00			-0.02	-0.01		
	(-0.65)	(0.51)			(-0.20)	(0.00)			(-0.46)	(-0.12)		
Non-resident Private (1st D)			-0.02	0.00			-0.01	-0.02			-0.01	-0.00
			(-0.92)	(0.10)			(-0.45)	(-0.51)			(-0.29)	(-0.01)
Non-resident Official (1st D)			0.00	0.01			0.01	0.01			-0.36	-0.35***
			(0.01)	(0.61)			(0.25)	(0.21)			(-1.50)	(-7.79)
Banks' Holdings (1st D)	0.02	0.06	0.02	0.05	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
	(1.18)	(1.05)	(1.17)	(1.04)	(0.25)	(0.32)	(0.23)	(0.19)	(0.40)	(0.55)	(0.36)	(0.52)
Change in Public Debt	0.05***	0.03	0.05***	0.02	0.11***	0.07*	0.11***	0.07*	0.01	-0.00	0.01	-0.00
	(4.34)	(1.68)	(4.35)	(1.52)	(5.55)	(2.13)	(5.58)	(1.99)	(0.45)	(-0.17)	(0.48)	(-0.13)
Debt to GDP	-0.00	0.02	-0.00	0.03	-0.00	0.02	-0.00	0.02	0.01	0.01	0.01	0.01
	(-0.97)	(1.61)	(-0.89)	(1.63)	(-0.47)	(1.24)	(-0.44)	(1.28)	(0.56)	(1.78)	(0.58)	(1.81)
Inflation	0.02	-0.01	0.02	-0.01	0.07	0.01	0.06	0.03	-0.04	-0.02	-0.04	-0.02
	(0.72)	(-0.24)	(0.58)	(-0.33)	(1.51)	(0.22)	(1.34)	(0.71)	(-0.96)	(-1.01)	(-0.97)	(-0.96)
Growth Trend	-0.00	0.07*	0.00	0.07*	-0.02	0.06	-0.02	0.04	0.07*	0.07**	0.07*	0.07**
	(-0.09)	(2.02)	(0.01)	(2.08)	(-0.95)	(1.14)	(-0.83)	(1.15)	(1.84)	(3.28)	(1.91)	(3.29)
Fed Funds Rate	0.00		0.00		0.00		0.00		-0.00		-0.00	
	(0.37)		(0.30)		(0.77)		(0.73)		(-0.42)		(-0.42)	
Credit Rating	-0.03***		-0.03***		-0.04***		-0.04***		-0.01		-0.01	
	(-4.79)		(-4.76)		(-4.56)		(-4.55)		(-0.46)		(-0.47)	
VIX	-0.00		-0.00		-0.00**		-0.00**		0.00		0.00	
	(-1.55)		(-1.54)		(-2.26)		(-2.22)		(0.14)		(0.22)	
Oil	-0.00		-0.00		-0.00		-0.00		0.00		0.00	
	(-0.07)		(-0.02)		(-1.02)		(-0.95)		(0.61)		(0.63)	
Govt Yield 10Y (Lag)		-0.16*		-0.17**		-0.11		-0.07		-0.23***		-0.23***
		(-2.06)		(-2.15)		(-0.62)		(-0.41)		(-4.29)		(-4.17)
R-squared	0.10		0.10		0.20		0.20		0.03		0.04	
Nb of Observations	537	518	537	518	322	312	322	312	215	206	215	206
Nb of Countries	18	18	18	18	10	10	10	10	8	8	8	8
Country Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

t statistics in parentheses. Note: Robust Standard Errors. * p<.10, ** p<.05, *** p<.01

Table 11: Determinants of Government Bond Yields in Developed Markets. Dependent variable: 10-y gov bond yield. Panel OLS Regressions.

	(1) JAP	(2) UK	(3) US	(4) FR	(5) GER	(6) NL	(7) GR	(8) IR	(9) IT	(10) PT	(11) SP
Non-resident Private	-0.06	0.09	-0.07	0.06	0.14	-0	0.41***	0.11**	0	0	0.14
(x Country Dummy)	(-0.30)	(0.65)	(-0.26)	(0.35)	(0.48)	(-0.01)	(9.06)	(2.50)	(.)	(.)	(1.57)
Non-resident Official	0.41	0.12	-0.03	0.06	0.18	-0	-0.99***	0.06	0	0	0.20**
(x Country Dummy)	(0.97)	(0.80)	(-0.19)	(0.36)	(0.62)	(-0.01)	(-3.42)	(1.61)	(.)	(.)	(2.09)
Banks	-0.04	-0.08	-0.04	0.08	0.34	-0.03	0.93***	0.09	0	0	-0.07
(x Country Dummy)	(-0.19)	(-0.45)	(-0.06)	(0.41)	(0.94)	(-0.07)	(9.06)	(0.73)	(.)	(.)	(-0.56)
Pension and Insurance	0.31	0.02	0.27	0.08	0.25	-0.07	0	0.53	0	0	-0.23
(x Country Dummy)	(0.92)	(0.32)	(0.43)	(0.41)	(0.25)	(-0.18)	(.)	(1.47)	(.)	(.)	(-1.14)
Investment Funds	-0.10	-0.19	-0.16	-0.03	0.07	-0.14	0	-0.58**	0	0	0.15
(x Country Dummy)	(-0.26)	(-1.57)	(-0.52)	(-0.16)	(0.16)	(-0.32)	(.)	(-2.35)	(.)	(.)	(0.77)
Change in Public Debt	0.06***	0.05***	0.05***	0.05***	0.05***	0.05***	0.02*	0.04**	0.06***	0.05***	0.06***
	(3.61)	(3.17)	(3.18)	(3.17)	(3.17)	(3.13)	(1.66)	(2.55)	(3.54)	(3.19)	(3.68)
Debt to GDP	-0.06***	-0.05***	-0.05***	-0.05***	-0.05***	-0.05***	-0.04***	-0.04***	-0.06***	-0.05***	-0.05***
	(-8.10)	(-7.14)	(-7.46)	(-7.81)	(-7.81)	(-7.66)	(-6.75)	(-5.40)	(-8.90)	(-7.83)	(-8.33)
Inflation	0.10***	0.10***	0.09***	0.10***	0.09***	0.10***	0.06**	0.15***	0.12***	0.10***	0.08**
	(2.78)	(2.80)	(2.64)	(2.79)	(2.67)	(2.83)	(2.03)	(4.10)	(3.50)	(2.77)	(2.42)
Growth Trend	-0.07***	-0.07***	-0.07***	-0.07***	-0.07***	-0.07***	-0.03*	-0.05**	-0.17***	-0.07***	-0.06***
	(-3.17)	(-3.26)	(-3.14)	(-3.27)	(-3.10)	(-3.30)	(-1.78)	(-2.36)	(-5.15)	(-3.24)	(-2.93)
Fed Funds Rate	0*	0**	0**	0**	0**	0**	0***	0***	0***	0**	0*
	(1.90)	(2.38)	(2.22)	(2.38)	(2.16)	(2.17)	(2.80)	(2.70)	(3.44)	(2.31)	(1.85)
Credit Rating	-0.29***	-0.28***	-0.28***	-0.28***	-0.28***	-0.28***	-0.21***	-0.29***	-0.28***	-0.28***	-0.29***
	(-30.64)	(-29.44)	(-30.13)	(-30.70)	(-30.80)	(-30.43)	(-20.62)	(-32.94)	(-29.99)	(-30.91)	(-32.05)
VIX	0*	0**	0**	0**	0**	0*	0***	0**	0**	0**	0**
	(1.71)	(2.39)	(2.28)	(2.12)	(2.16)	(1.89)	(2.72)	(2.02)	(2.37)	(2.13)	(1.99)
Oil	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0	-0
	(-0.87)	(-0.77)	(-0.74)	(-0.81)	(-0.70)	(-0.63)	(-0.68)	(-1.55)	(-0.18)	(-0.79)	(-0.64)
R-squared	0.71	0.71	0.71	0.71	0.71	0.71	0.78	0.73	0.73	0.71	0.72
Nb of Observations	561	561	561	561	561	554	561	560	528	561	561
Nb of Countries	18	18	18	18	18	18	18	18	17	18	18
Country Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Note: Robust Standard Errors. *t* statistics in parentheses. * p<.10, ** p<.05, *** p<.01

Table 12: Determinants of Government Bond Yields in Emerging Markets. Dependent variable: 10-y gov bond yield. Panel OLS Regressions.

	(1) Mex	(2) Bra	(3) Czech	(4) Hun	(5) Poland	(6) Turk	(7) Ind	(8) Mal	(9) Thai
Non-resident Private	-0.46	0.41**	0.01	-0.48***	0.02	0	0.64	0	0
(x Country Dummy)	(-1.54)	(2.26)	(0.12)	(-5.44)	(0.14)	(.)	(1)	(.)	(.)
Non-resident Official	0	0	0	-0.15	-1.21	0	0	0	0
(x Country Dummy)	(.)	(.)	(.)	(-0.32)	(-1.52)	(.)	(.)	(.)	(.)
Banks	-0.47	0.11	0.03	-0.46***	-0.01	0	-0.05	0	0
(x Country Dummy)	(-1.47)	(0.90)	(0.67)	(-6.01)	(-0.05)	(.)	(-0.34)	(.)	(.)
Pension and Insurance	-0.30	0.53	0.18	-0.41***	0.05	0	0.10	0	0
(x Country Dummy)	(-1.04)	(1.41)	(1.14)	(-4.20)	(0.50)	(.)	(0.70)	(.)	(.)
Investment Funds	-0.40	-0.09	-0.48	-0.20	-0.19	0	0.10	0	0
(x Country Dummy)	(-1.31)	(-0.48)	(-1.64)	(-0.70)	(-0.61)	(.)	(0.62)	(.)	(.)
Change in Public Debt	0.04**	0.05***	0.05***	0.05***	0.05***	0.06***	0.05***	0.05***	0.05***
	(2.50)	(3.22)	(3.28)	(3.25)	(3.25)	(3.21)	(3.01)	(3.19)	(2.97)
Debt to GDP	-0.06***	-0.05***	-0.05***	-0.05***	-0.05***	-0.05***	-0.05***	-0.05***	-0.05***
	(-8.61)	(-7.71)	(-7.83)	(-8.84)	(-7.87)	(-8.11)	(-7.38)	(-7.83)	(-7.80)
Inflation	0.07*	0.09**	0.10***	0.09***	0.09**	0.10***	0.09**	0.10***	0.08**
	(1.87)	(2.51)	(2.84)	(2.74)	(2.45)	(2.69)	(2.37)	(2.77)	(1.98)
Growth Trend	-0.06***	-0.08***	-0.06***	-0.08***	-0.08***	-0.07***	-0.07***	-0.07***	-0.07***
	(-2.92)	(-3.53)	(-2.78)	(-4)	(-3.47)	(-3.18)	(-3.20)	(-3.24)	(-3.09)
Fed Funds Rate	0	0***	0**	0**	0***	0**	0**	0**	0*
	(1.54)	(3.18)	(2.34)	(2.47)	(2.68)	(2.10)	(2.36)	(2.31)	(1.92)
Credit Rating	-0.29***	-0.29***	-0.29***	-0.29***	-0.28***	-0.29***	-0.28***	-0.28***	-0.28***
	(-31.41)	(-31.57)	(-31.37)	(-32.91)	(-31.09)	(-30.88)	(-30.54)	(-30.91)	(-30.20)
VIX	0**	0**	0*	0**	0*	0**	0**	0**	0**
	(2.10)	(2.24)	(1.90)	(2.39)	(1.93)	(2.03)	(2.05)	(2.13)	(2.31)
Oil	0	-0	-0	0	-0	-0	-0	-0	-0
	(0.31)	(-0.87)	(-1.32)	(0.55)	(-0.93)	(-0.61)	(-1)	(-0.79)	(-0.62)
R-squared	0.72	0.72	0.71	0.74	0.71	0.71	0.71	0.71	0.71
Nb of Observations	561	557	561	561	561	551	553	561	528
Nb of Countries	18	18	18	18	18	17	18	18	17
Country Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y

Note: Robust Standard Errors. *t* statistics in parentheses. * p<.10, ** p<.05, *** p<.01

Table 13: Determinants of Government Bond Yields in Developed Markets. Dependent variable: 10-y gov bond yield. Individual OLS Regressions.

	(1) JAP	(2) JAP	(3) UK	(4) UK	(5) US	(6) US	(7) FR	(8) FR	(9) GER	(10) GER	(11) NL	(12) NL
Fed Funds Rate	0***	0**	0***	-0**	0***	0	0***	0***	0***	0***	0***	0
	(4.26)	(2.78)	(3.24)	(-2.56)	(5.52)	(1.26)	(2.93)	(2.94)	(3.86)	(4.04)	(4.01)	(1.24)
Credit Rating	0	-0	0	0	0.71***	0.64***	0.38**	0.49	0	0	0	0
	(0.05)	(-0.04)	(.)	(.)	(5)	(4.07)	(2.63)	(1.59)	(.)	(.)	(.)	(.)
VIX	-0	-0	-0	-0**	-0	-0**	0*	0**	0	0	0**	0
	(-0.36)	(-0.06)	(-0.59)	(-2.72)	(-1.14)	(-2.35)	(1.75)	(2.26)	(0.98)	(0.48)	(2.30)	(0.22)
Oil	-0	0	-0***	-0*	-0*	-0**	-0	0	-0**	-0	-0*	0
	(-0.44)	(0.02)	(-2.79)	(-1.72)	(-1.91)	(-2.07)	(-0.03)	(1.02)	(-2.20)	(-0.95)	(-1.78)	(1.65)
Non-resident Private		0.01		0.04		-0.07		0.12		0.02		-0.02
		(0.12)		(0.51)		(-1.39)		(1.64)		(0.16)		(-0.12)
Non-resident Official		-0.05		0.13		-0.07		0.09		0.08		-0.02
		(-0.26)		(1.48)		(-1.23)		(1.14)		(0.51)		(-0.13)
Banks Holders		0.10		-0.14*		-0.46*		0.22**		0.28		-0.11
		(1.14)		(-1.72)		(-1.93)		(2.51)		(1.25)		(-0.67)
Pension and Insurance		-0.07		0.03		0.20		0.15*		1.59***		-0.17
		(-0.67)		(0.71)		(0.97)		(1.77)		(2.96)		(-1)
Investment Funds		0.03		0.06		0.23		0.05		-0.36		-0.05
		(0.18)		(0.66)		(1.36)		(0.44)		(-1.54)		(-0.16)
R-squared	0.60	0.62	0.57	0.80	0.87	0.90	0.49	0.67	0.54	0.79	0.51	0.86
Nb of Observations	35	35	35	35	35	35	35	35	35	35	35	28
Nb of Countries	1	1	1	1	1	1	1	1	1	1	1	1

Note: Robust Standard Errors. *t* statistics in parentheses. * p<.10, ** p<.05, *** p<.01

Table 14: Determinants of Government Bond Yields in Developed Markets. Dependent variable: 10-y gov bond yield. Individual OLS

	(13) GR	(14) GR	(15) IR	(16) IR	(17) IT	(18) IT	(19) PT	(20) PT	(21) SP	(22) SP
Fed Funds Rate	0	0.01	-0	-0	-0	-0	-0	-0	-0	-0
	(0.80)	(1.03)	(-0.68)	(-1.16)	(-0.19)	(-0.19)	(-0.11)	(-0.11)	(-0.68)	(-1.56)
Credit Rating	-0.32***	-0.29***	-0.08***	-0.20***	-0.03	-0.03	-0.14***	-0.14***	-0.03***	-0.04
	(-10.48)	(-6.34)	(-2.91)	(-4.85)	(-1.30)	(-1.30)	(-6.31)	(-6.31)	(-2.78)	(-1.69)
VIX	0	0	0	-0	0	0	0	0	0	-0**
	(1.21)	(1.15)	(0.82)	(-1.40)	(0.39)	(0.39)	(0.40)	(0.40)	(0)	(-2.14)
Oil	-0	0	0	-0*	0**	0**	0	0	0***	0
	(-0.11)	(0.02)	(0.72)	(-1.84)	(2.64)	(2.64)	(1.67)	(1.67)	(3.72)	(0.93)
Non-resident Private		0.07		0.04						-0.11**
		(0.40)		(0.73)						(-2.71)
Non-resident Official		-0.57		0.05						0.01
		(-0.54)		(1.59)						(0.14)
Banks Holders		0.18		-0.10						-0.15**
		(0.54)		(-0.74)						(-2.68)
Pension and Insurance				-0.09						0.09
				(-0.27)						(0.83)
Investment Funds				-0.35						-0.28**
				(-1.39)						(-2.46)
R-squared	0.92	0.92	0.66	0.88	0.44	0.44	0.85	0.85	0.68	0.81
Nb of Observations	35	35	35	32	35	35	35	35	35	35
Nb of Countries	1	1	1	1	1	1	1	1	1	1

Note: Robust Standard Errors. *t* statistics in parentheses. * p<.10, ** p<.05, *** p<.01

Table 15: Determinants of Government Bond Yields in Emerging Markets. Dependent variable: 10-y gov bond yield. Individual OLS Regressions.

	(1) MEX	(2) MEX	(3) BRA	(4) BRA	(5) CZECH	(6) CZECH	(7) HUN	(8) HUN	(9) PL	(10) PL
Fed Funds Rate	0	0	-0.01***	-0	0	0	-0	0	-0	-0
	(1.25)	(0.91)	(-3.27)	(-0.77)	(0.15)	(0.55)	(-1.02)	(1.60)	(-0.86)	(-1.10)
Credit Rating	-0.08	0.18	-0.59***	-0.63***	-0.28**	-0.26**	0.02	0.04	-0.08	-0.12
	(-0.57)	(1.62)	(-7.47)	(-5.92)	(-2.35)	(-2.32)	(0.46)	(0.71)	(-0.73)	(-1.07)
VIX	0.00	0.00	0.00***	0.00***	0.00***	0.00	0.00***	0.00	0.00	-0.00
	(0.49)	(0.78)	(4.78)	(4.96)	(3.30)	(1.07)	(3.74)	(1.16)	(1.06)	(-0.24)
Oil	-0.00**	0.00	0.00***	0.00***	0.00	-0.00	-0.00	0.00	-0.00	0.00**
	(-2.50)	(1.47)	(5.50)	(5.75)	(1.05)	(-0.62)	(-0.36)	(0.03)	(-0.51)	(2.22)
Non-resident Private		-0.30*		0.42**		0.07		-0.27		-0.26***
		(-2.03)		(2.59)		(0.89)		(-1.68)		(-3.31)
Non-resident Official		0.00		0.00		0.00		-0.26		-1.18***
		(.)		(.)		(.)		(-0.71)		(-3.97)
Banks Holders		-0.20		0.05		0.01		0.08		-0.18*
		(-1.25)		(0.63)		(0.18)		(0.44)		(-2.03)
Pension and Insurance		-0.15		0.40*		0.11		-0.38***		-0.19*
		(-1.06)		(1.96)		(0.96)		(-3.02)		(-2.04)
Investment Funds		-0.29*		0.02		-0.36		0.01		-0.14
		(-1.92)		(0.16)		(-1.61)		(0.04)		(-0.91)
R-squared	0.49	0.87	0.79	0.87	0.39	0.55	0.50	0.70	0.15	0.67
Nb of Observations	35	35	28	24	35	35	35	35	35	35
Nb of Countries	1	1	1	1	1	1	1	1	1	1

Note: Robust Standard Errors. *t* statistics in parentheses. * p<.10, ** p<.05, *** p<.01

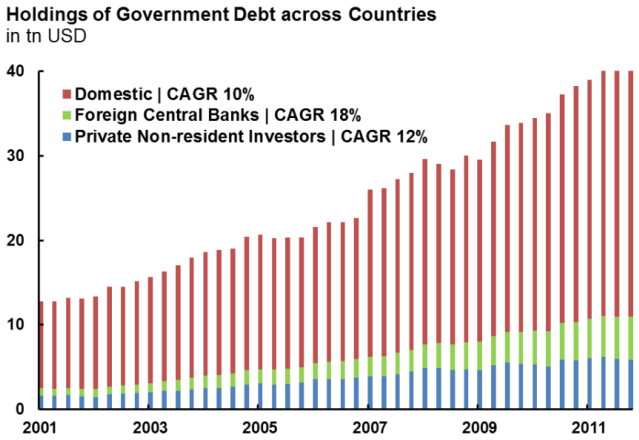
Table 16: Determinants of Government Bond Yields in Emerging Markets. Dependent variable: 10-y gov bond yield. Individual OLS Regressions.

	(11) TURK	(12) TURK	(13) INDIA	(14) INDIA	(15) MAL	(16) MAL	(17) THAI	(18) THAI
Fed Funds Rate	0	0	0	0	0	0	0.00	0.00
	(.)	(.)	(1.69)	(0.02)	(0.02)	(0.02)	(0.71)	(0.71)
Credit Rating	-1.26***	-1.26***	0.29***	0.00	0.00	0.00	0.11	0.11
	(-3.43)	(-3.43)	(4.22)	(.)	(.)	(.)	(0.39)	(0.39)
VIX	0.00	0.00	-0.00**	-0.00**	-0.00**	-0.00**	-0.00	-0.00
	(0.17)	(0.17)	(-2.40)	(-2.52)	(-2.52)	(-2.52)	(-1.42)	(-1.42)
Oil	-0.00	-0.00	0.00**	0.00	0.00	0.00	-0.00	-0.00
	(-0.38)	(-0.38)	(2.74)	(1.50)	(1.50)	(1.50)	(-0.64)	(-0.64)
Non-resident Private				0.23		0.23		
				(0.74)		(0.74)		
Non-resident Official				0.00		0.00		
				(.)		(.)		
Banks Holders				-0.01		-0.01		
				(-0.24)		(-0.24)		
Pension and Insurance				0.02		0.02		
				(0.18)		(0.18)		
Investment Funds				-0.02		-0.02		
				(-0.21)		(-0.21)		
R-squared	0.65	0.65	0.76	0.70	0.57	0.70	0.42	0.42
Nb of Observations	12	12	35	24	24	24	35	35
Nb of Countries	1	1	1	1	1	1	1	1

Note: Robust Standard Errors. *t* statistics in parentheses. * p<.10, ** p<.05, *** p<.01

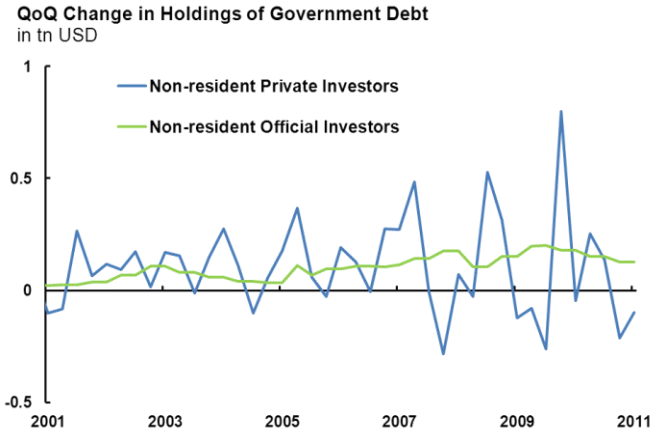
Figures

Figure 1



Note : Compounded Annual Growth Rate (CAGR) between 2001Q1 and 2011Q4

Figure 2



Note : Non-resident Official Holdings are interpolated from annual data

Figure 3

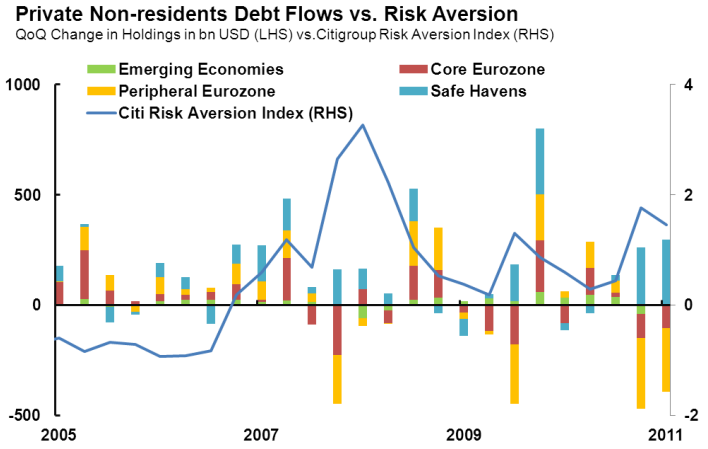


Figure 4

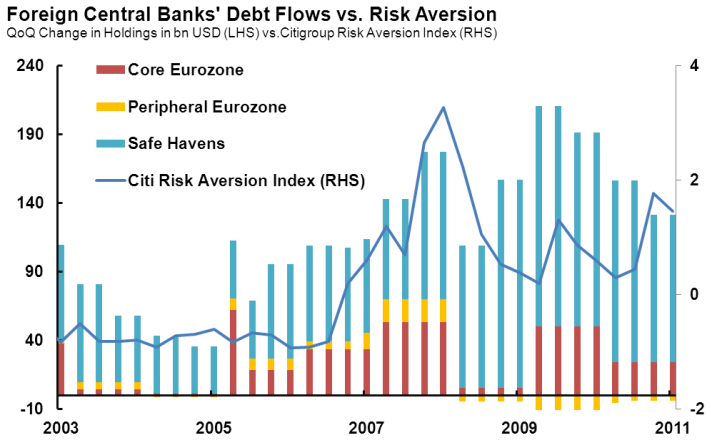


Figure 5

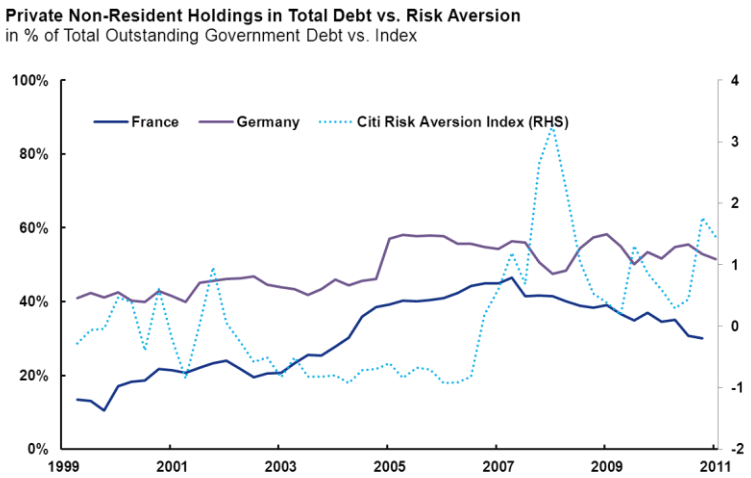


Figure 6

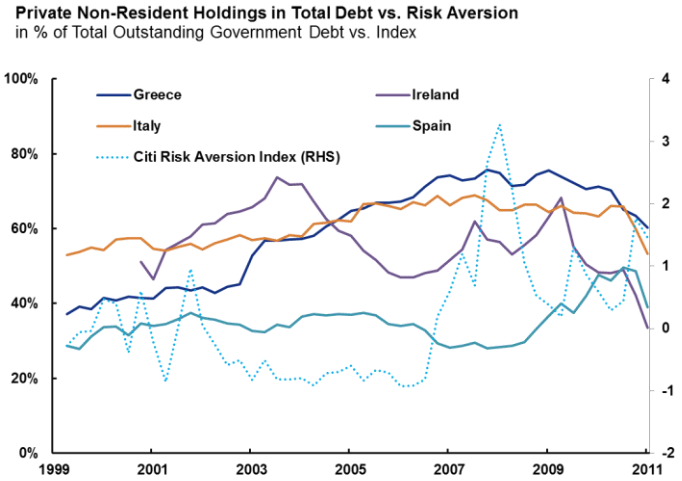


Figure 7

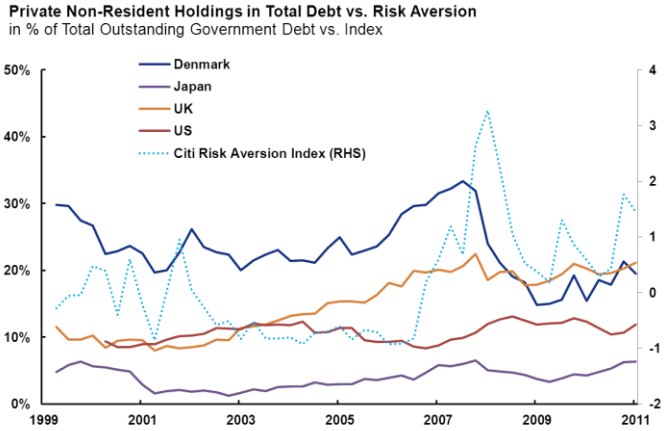
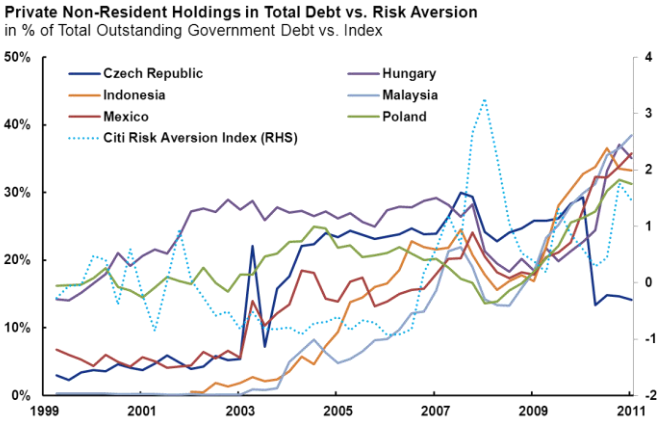


Figure 8



Note: Holdings of private non-resident are determined are calculated as the difference between total non-resident holdings extracted from the naional sources and official non-resident holdings based on survey estimates of the IMF CPIS. In consequence presented statistics may lack precision to some extent. Ireland: data from the IMF (2013) "Tracking Global Demand" dataset.

Figure 9

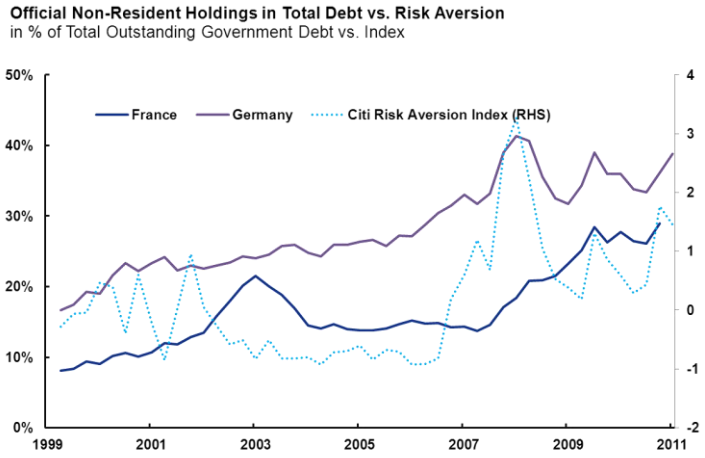


Figure 10

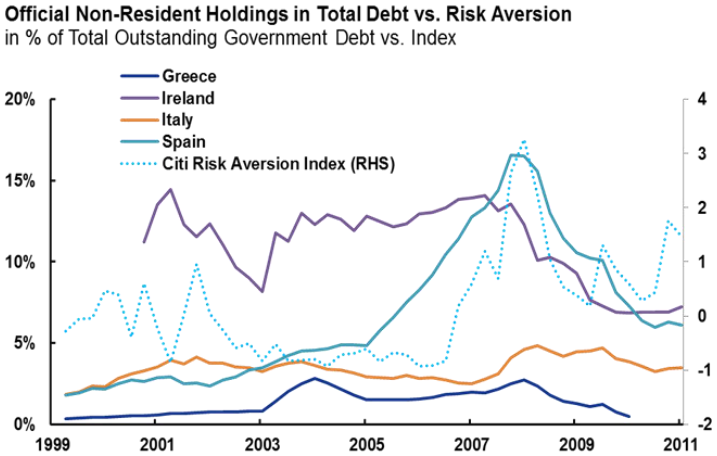
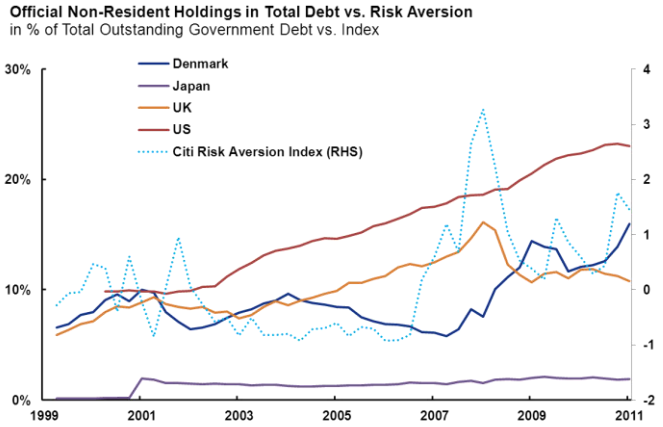


Figure 11



Note: Holdings of private non-resident are determined are calculated as the difference between total non-resident holdings extracted from the naional sources and official non-resident holdings based on survey estimates of the the US Treasury for the US and IMF CPIS for all other countries. In consequence presented statistics may lack precision to some extent. In the Eurozone official non-resident holdings exclude holdings of the ECB.

Figure 12

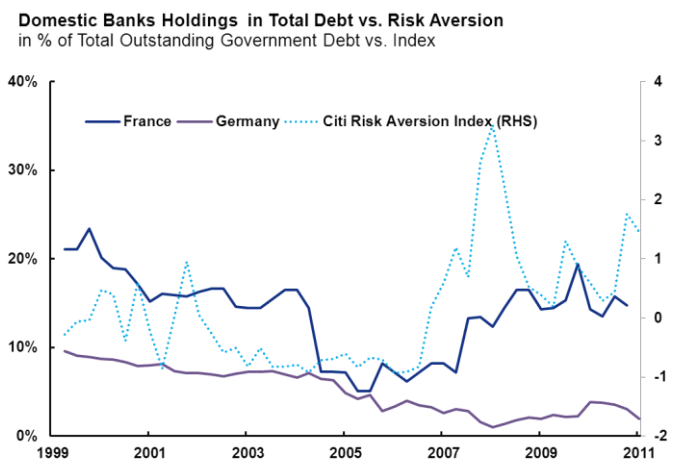


Figure 13

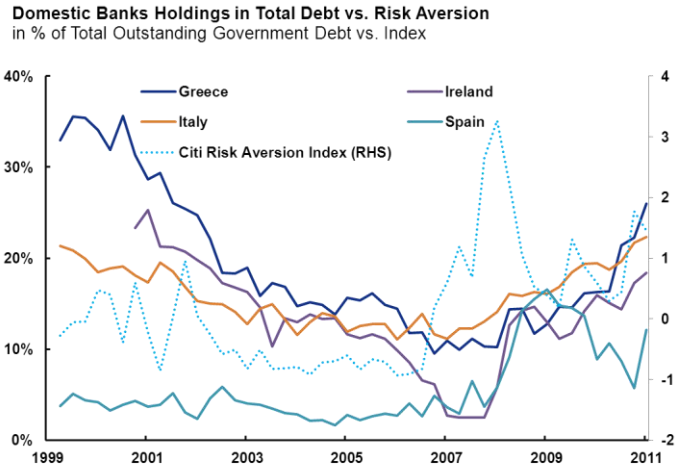


Figure 14

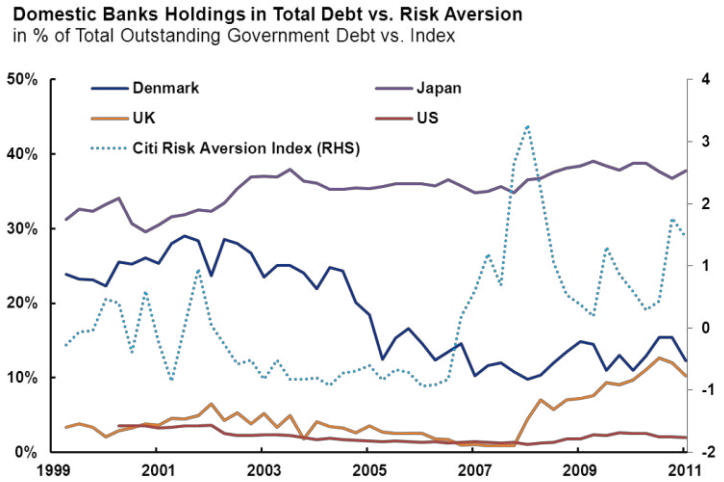


Figure 15

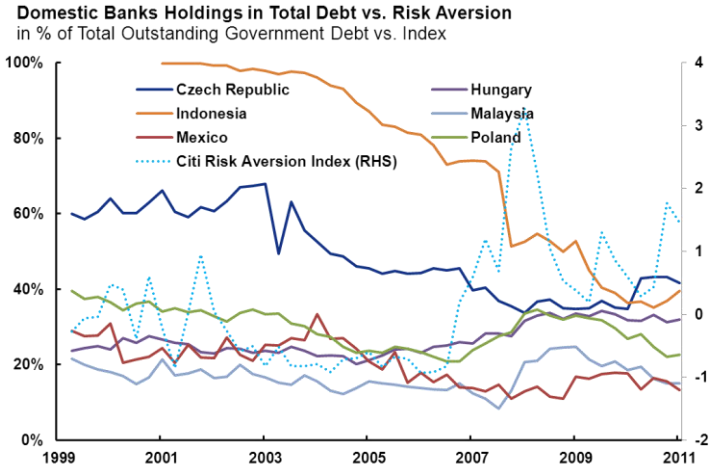


Figure 16

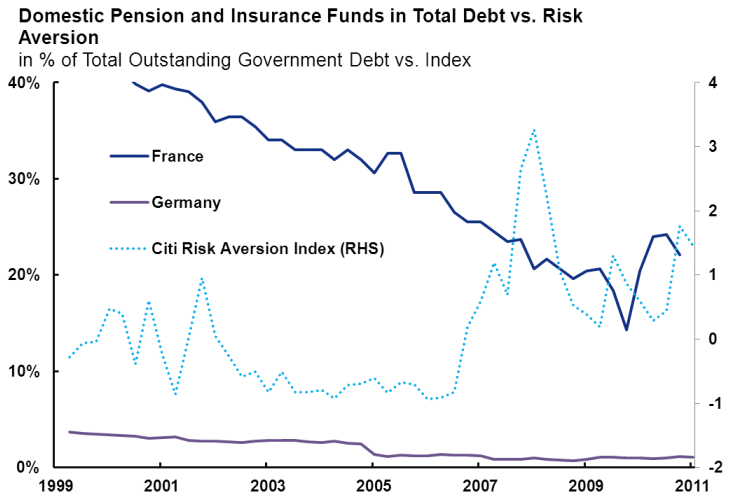


Figure 17

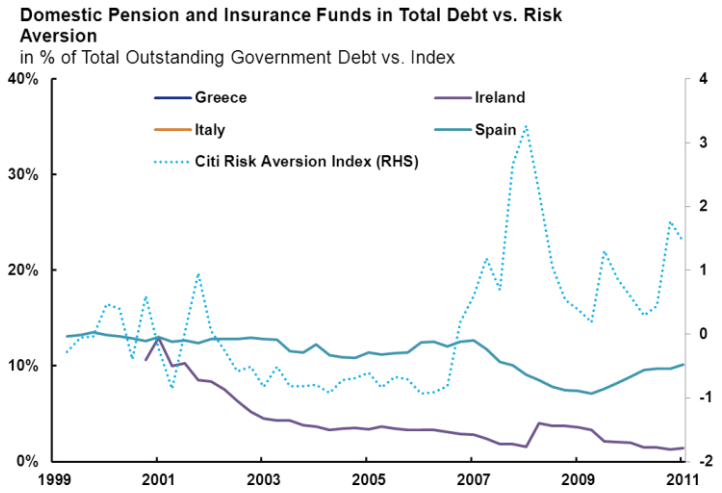


Figure 18

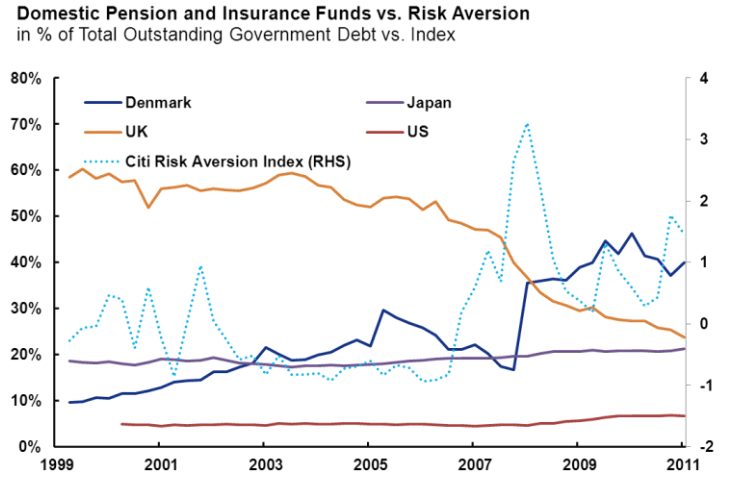


Figure 19

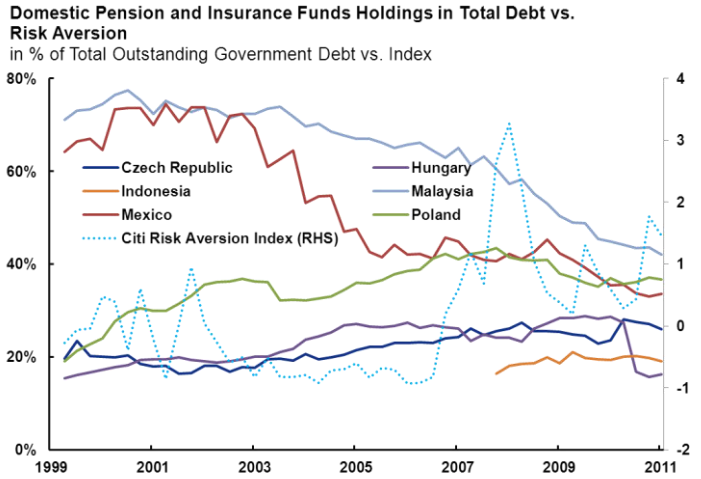


Figure 20

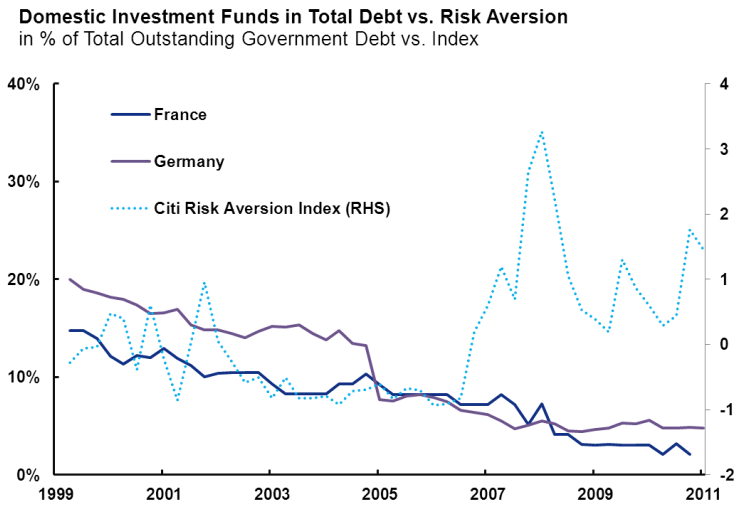


Figure 21

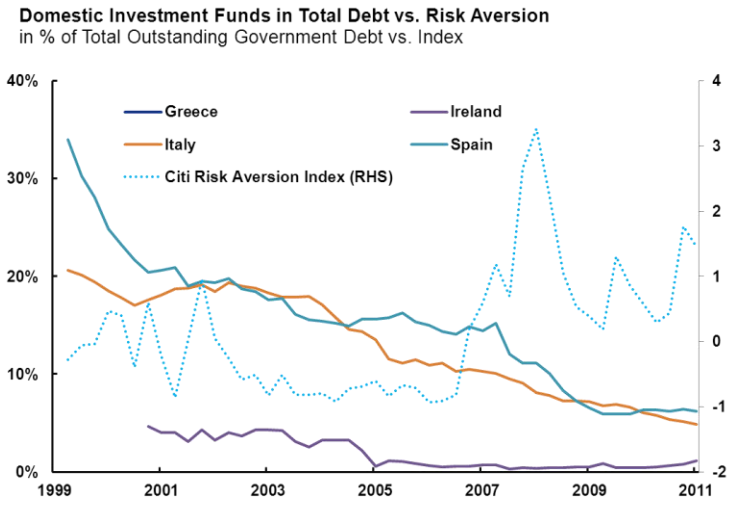


Figure 22

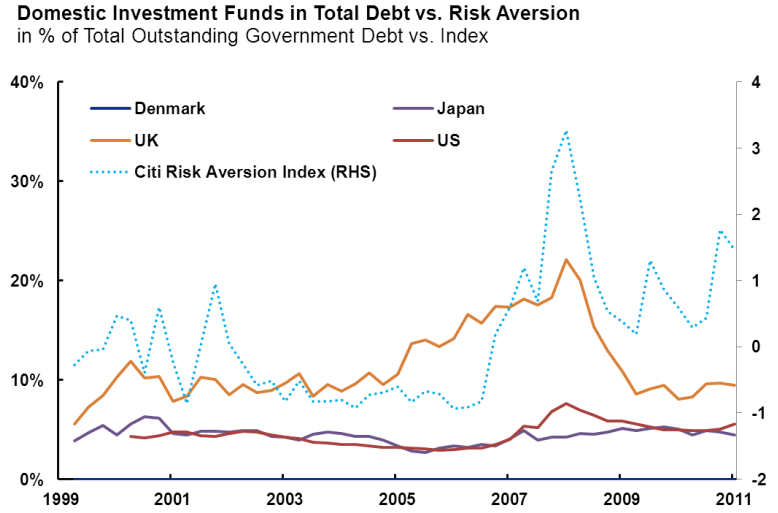


Figure 23

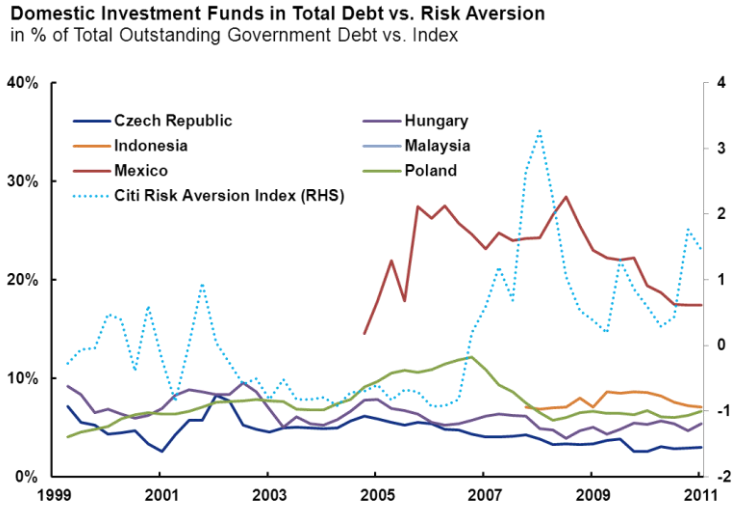


Figure 24

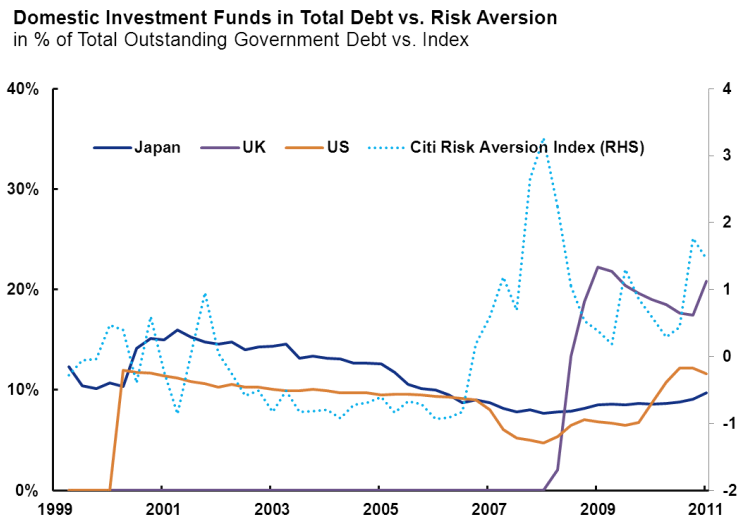


Figure 25

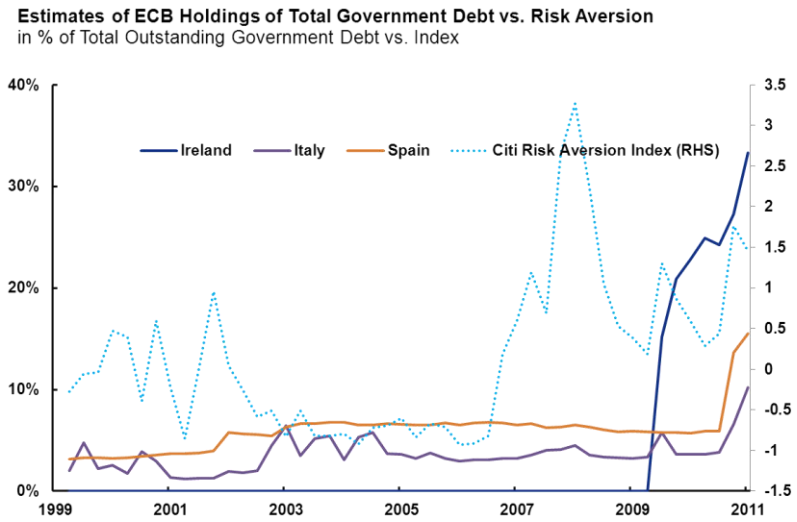
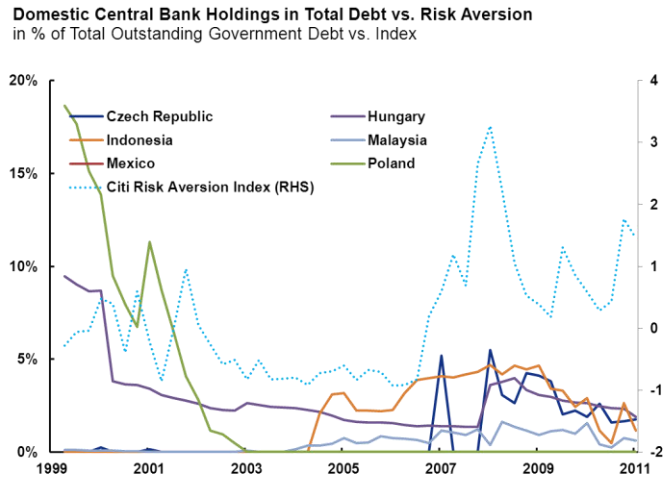


Figure 26



Appendix

Appendix Table 1 : List of explanatory variables

Indicator	Underlying Data	Unit	Source
GDP Growth Trend	Real GDP in Local Currency detrended with HP-filter	YoY%	IMF
Change in Public Debt	Public Debt from national sources Nomina GDP from IMF WEO	% of GDP	National Sources and IMF
Change in Private Debt	Private Debt from national sources Nomina GDP from IMF WEO	% of GDP	National Sources and IMF
Sovereign Yield	Government Yield corresponding to average maturity	in %	Bloomberg
Risk Aversion Index	Citigroup Risk Aversion Index	Score 0 to 100	Bloomberg
Credit Rating	S&P Rating - Linear conversion	Score 0 to 100	S&P Ratings
Change in Political Risk	Economist Intelligence Unit Political Risk	Score 0 to 100	Bloomberg
Financial Openness	Chin Ito Financial Openness Datset (2011)	Score 0 to 100	Chin Ito Datset (2011)
Current Account Balance	IMF WEO Data	% of GDP	IMF
VIX	Chicago Mercantile Exchange Volatility Index	Score	Bloomberg

Appendix Table 2a : Classification of Investor Holdings based on Original Sources

Region	Country	Debtholder categories provided by the authorities	Non-residents	Banks	State	Central Bank	Insurance and Pension Funds	Investment/Mutual Funds	Households	Non-financial corporations	Other
Eurozone	France	I. Credit Institutions (établissement de crédit) II. Insurance (assurances) III. Mututal Funds (OPCVM) IV. Others V. Non-residents	V. Non-residents	I. Credit Institutions	N/A	N/A	II. Insurance	III. Mututal Funds	N/A	N/A	IV. Others
	Germany	I. Non-financial companies II. Financial Institutions III. Banks IV. Other Financial Institutions V. Insurance Companies VI. Households VII. Other VIII. Non-resident investors	VIII. Non-resident investors	III. Banks	N/A	N/A	V. Insurance Companies	IV. Other Financial Institutions	VI. Households	I. Non-financial companies	VII. Other
	Greece	I. Nonfinancial corporations II. Financial corporations 1) National Central Bank 2) Other Monetary Financial Institutions (OMFIs) 3) Other financial intermediaries 4) Insurance and pension funds III. General government IV. Households and Non-Profit Institutions Serving Households V. Rest of the world	V. Rest of the world	II. 2) of which Other Monetary Financial Institutions (OMFIs)	III. General government	II. Financial corporations 1) National Central Bank	II. Financial corporations 4) Insurance and pension funds	II. Financial corporations 3) Other financial intermediaries	IV. Households and Non-Profit Institutions Serving Households	I. Nonfinancial corporations	#N/A
	Ireland	I. MFIs and Central Bank II. General Government III. Financial Intermediaries IV. Financial Auxillaries V. Insurance Companies and Pension Funds VI. Other financial Intermediaries VII. Non-Financial Corporations VIII. Households IX. Non-Resident	IX. Non-Resident	I. MFIs and Central Bank	II. General Government	N/A	V. Insurance Companies and Pension Funds	VI. Other financial Intermediaries IV. Financial Auxillaries	VIII. Households	VII. Non-Financial Corporations	
	Italy	I. Central Bank II. Other Investors. Includes insurance and social security institutions III. Investment Funds IV. Banks V. Foreign Sector	V. Foreign Sector	IV. Banks	N/A	I. Central Bank	N/A	III. Investment Funds	N/A	N/A	II. Other Investors. Includes insurance and social security institutions
	Netherlands	I. Investment funds II. Households III. Pension funds IV. Insurance companies V. Banks VI. Non-residents	VI. Non-residents	V. Banks	N/A	N/A	IV. Insurance companies	I. Investment funds	II. Households	N/A	N/A
	Portugal	I. Residents II. Non-residents	II. Non-residents	N/A	N/A	N/A	N/A	N/A	N/A	N/A	I. Residents
	Spain	I. Monetary Financial Institutions excl. Money Market Funds: 1) Central Bank 2) MFIs II. Funds: 1) Mutual Funds, 2) Insurance and Pension Funds, 3) Other funds III. Non-financial companies IV. Households V. Public Administration VI. Non-residents	VI. Non-residents	I. 2) MFIs	V. Public Administration	I. 1) Central Bank	II. 2) Insurance and Pension Funds	II. 1) Mutual Funds	IV. Households	II. Non-financial companies	II. 3) Other funds

Appendix Table 2b : Classification of Investor Holdings based on Original Sources

Region	Country	Debtholder categories provided by the authorities	Non-residents	Banks	State	Central Bank	Insurance and Pension Funds	Investment/Mutual Funds	Households	Non-financial corporations	Other
Safe Havens	Japan	I. Financial institutions 1. Central bank 2. Depository corporations i. Foreign banks in Japan 3. Insurance 4. Pension funds 5. Other financial intermediaries i. Financial dealers and brokers ii. Public financial institutions iii. Securities investment trusts iv. Nonbanks II. General government III. Private nonfinancial corporations IV. Public nonfinancial corporations V. Households VI. Private non-profit institutions serving households VII. Overseas	VII. Overseas	I. 2. Depository corporations	II. General government IV. Public nonfinancial corporations 5. ii. Public financial institutions	I. 1. Central bank	I. 3. Insurance I. 4. Pension funds	I. 5. i. Financial dealers and brokers I. 5. iii. Securities investment trusts I. 5. iv. Nonbanks	V. Households VI. Private non-profit institutions serving households	III. Private nonfinancial corporations	N/A
	Swityerland	1. Foreign depositors 2. Domestic depositors: 3a. Dom Financial institutions (without investment funds) 3b. Dom Collective investment institutions pursuant to CISA 4. Dom Insurance companies 5. Dom Pension funds only 6. Dom Financial auxiliaries 7. Dom Social security institutions	1. Foreign depositors	3a. Dom Financial institutions (without investment funds)	7. Dom Social security institutions		4. Dom Insurance companies 5. Dom Pension funds only	6. Dom Financial auxiliaries 3b. Dom Collective investment institutions pursuant to CISA			
	UK	I. Non-financial Corporations: (1) Public, (2) Private II. Monetary Financial Institutions III. Insurance Companies and Pension funds IV. Other Financial Institutions V. Bank of England VI. Private Non-Financial companies VII. Households VIII. Overseas Holdings (Rest of World); for bonds (1) Foreign Central Banks, (2) Other IX. Central Government	VIII. Overseas Holdings	II. Monetary Financial Institutions	N/A	V. Bank of England	III. Insurance Companies and Pension funds	N/A	VII. Households	VI. Private Non-Financial companies	N/A
	US	I. Fed Reserve and intra-governmental II. Depository institutions III. U.S. savings bonds IV. Pension Funds a. Private b. State V. Insurance companies VI. Mutual funds VII. State and local governments VIII. Foreign and international IX. Other investors	VIII. Foreign and international	II. Depository institutions	I. Fed Reserve and intra-governmental after deducting "Federal Reserve: FED Holdings" IV. Pension Funds b. State VII. State and local governments	Federal Reserve: FED Holdings	IV. Pension Funds a. Private V. Insurance companies	VI. Mutual funds	III. U.S. savings bonds	N/A	IX. Other investors

Appendix Table 2c : Classification of Investor Holdings based on Original Sources

Region	Country	Debtholder categories provided by the authorities	Non-residents	Banks	State	Central Bank	Insurance and Pension Funds	Investment/Mutual Funds	Households	Non-financial corporations	Other
Developed Economies	Australia	I. Non-resident holdings II. Other banks III. Government financial institutions IV. Reserve Bank V. Life assurance offices VI. Other private financial institutions VII. Other public authorities	Non-resident holdings	Other banks	Government financial institutions	Reserve Bank	Life assurance offices	Other private financial institutions			Other public authorities
	Canada	I. Nonresident bond and bills holdings II. Treasury bonds and bills held by Bank of Canada III. Treasury bonds and bills held by Bank of Canada	Nonresident bond and bills holdings			Treasury bonds and bills held by Bank of Canada					
	Denmark	I. Non-financial corporations II. Monetary financial institutions and other financial intermediaries III. Insurance corporations and pension funds IV. General government V. Households VI. Other domestic VII. Abroad	VII. Abroad	II. Monetary financial institutions and other financial intermediaries	IV. General government	N/A	III. Insurance corporations and pension funds	N/A	N/A	I. Non-financial corporations	VI. Other domestic
	Iceland	I. Banks & Saving Banks II. Miscellaneous credit undertakings III. Mutual and inv funds IV. Pension Funds V. Firms VI. Households VII. Others VIII. Foreign investors	VIII. Foreign investors	I. Banks & Saving Banks II. Miscellaneous credit undertakings	N/A	N/A	IV. Pension Funds	III. Mutual and inv funds	VI. Households	V. Firms	VII. Others
	Israel	I. Public II. Mutual Funds III. Provident and advanced study funds IV. Pension funds V. Commercial banks VI. Insurance companies VII. Non-residents VIII. Bank of Israel	VII. Non-residents	V. Commercial banks	N/A	VIII. Bank of Israel	III. Provident and advanced study funds IV. Pension funds VI. Insurance companies	II. Mutual Funds	N/A	N/A	I. Public

Appendix Table 2d : Classification of Investor Holdings based on Original Sources

Region	Country	Debtholder categories provided by the authorities	Non-residents	Banks	State	Central Bank	Insurance and Pension Funds	Investment/Mutual Funds	Households	Non-financial corporations	Other
Emerging Economies - Asia	India	I. Commercial Banks II. Insurance Companies III. Primary Dealers IV. Mutual Funds V. Co-Operative Banks VI. Financial Institutions VII. Corporates VIII. Foreign Institutional Investors IX. Provident Funds - social security funds managed by the Government of India X. Reserve Bank of India XI. Others	VIII. Foreign Institutional Investors	I. Commercial Banks V. Co-Operative Banks	IX. Provident Funds - social security funds managed by the Government of India	X. Reserve Bank of India	II. Insurance Companies	IV. Mutual Funds	N/A	VII. Corporates	III. Primary Dealers VI. Financial Institutions XI. Others
	Indonesia	I. Banks: 1) State Banks – Recap 2) Private Banks – Recap 3) Non Recap Banks 4) Regional Banks 5) Bank Syariah II. Bank Indonesia*) III. Mutual Fund IV. Insurance Company V. Foreign Holder VI. Pension Fund VII. Securities Company VIII. Others	V. Foreign Holder	I. Banks 2) Private Banks – Recap 3) Non Recap Banks 4) Regional Banks 5) Bank Syariah	I. Banks: 1) State Banks – Recap	II. Bank Indonesia*)	IV. Insurance Company VI. Pension Fund	III. Mutual Fund VII. Securities Company	N/A	N/A	VIII. Others
	Malaysia	Categories for bills: I. Central Bank of Malaysia II. Banking institutions III. Other Categories for bonds I. Public Sector: 1. General government, 2. Other II. Social security institutions: 1. Employees Provident Fund, 2. SOCSO(Social Security), 3. Other III. Insurance companies IV. Financial Sector: 1. Central Bank of Malaysia, 2. Banking institutions, 3. National Savings Bank, 4. Other V. Foreign holders	V. Foreign holders	IV. 2. Banking Institutions IV. 3. National Savings Bank	I. Public Sector (1) + (2)	IV. 1. Central Bank of Malaysia	III. Insurance companies II. Social security institutions: (1) + (2) + (3)	N/A	N/A	N/A	For Bills: III. Other
	Thailand	I. Central Bank II. Other depository corporations III. Financial corporations not elsewhere classified IV. Other Non-financial Corporations V. Central Government VI. Local Government VII. Public Non-financial Corporations VIII. Households and non-profit institutions serving households IX. Non-residents	V. Non-residents	II. Other depository corporations	IV. Local Governments I. Central Government VIII. Public non-financial corporations	N/A	N/A	II. Financial Corporations	III. Households	VII. Other non-financial corporations	N/A

Appendix Table 2e: Classification of Investor Holdings based on Original Sources

Region	Country	Debtholder categories provided by the authorities	Non-residents	Banks	State	Central Bank	Insurance and Pension Funds	Investment/Mutual Funds	Households	Non-financial corporations	Other
Non-euro EMEA	Bulgaria	I. Government banks II. Private Banks III. Local nonbank financial institutions, companies and individuals a. Insurance companies and pension funds (from 2002 onwards) IV. Foreign Investors	IV. Foreign Investors	II. Private Banks	I. Government banks	N/A	II. a. Insurance companies and pension funds (from 2002 onwards)	N/A	N/A	N/A	N/A
	Czech Republic	1) Public 2) National private 3) Foreign controlled II. The central bank III. Other monetary financial institutions 1) Public 2) National private 3) Foreign controlled IV. Credit corporations 1) Public 2) National private 3) Foreign controlled V. Financial auxiliaries 1) Public 2) National private 3) Foreign controlled VI. Pension funds 1) Private 2) Foreign controlled VII. Investment corporation 1) National private 2) Foreign controlled VIII. Insurance corporations 1) Public 2) National private 3) Foreign controlled IX. Government 1) Central government 2) Local government 3) Social security funds X. Households XI. Nonprofit institutions serving households	XII. Rest of the world	III. Other monetary financial institutions: 2) National private, 3) Foreign controlled	I. Non-financial corporations: 1) Public III. Other monetary financial institutions: 1) Public IV. Credit corporations: 1) Public V. Financial auxiliaries: 1) Public IX. Government: 1) Central government, 2) Local government, 3) Social security funds VIII. Insurance corporations: 1) Public	II. The central bank	VI. Pension funds: 1) Private, 2) Foreign controlled: VIII. Insurance corporations: 1) Public, 2) National private, 3) Foreign controlled	V. Financial auxiliaries: 2) National private, 3) Foreign controlled VII. Investment corporation: 1) National private, 2) Foreign controlled	X. Households XI. Nonprofit institutions serving households	I. Non-financial corporations: 2) National private, 3) Foreign controlled	N/A
	Hungary	I. Nonfinancial corporations II. Financial corporations 1) Central Bank 2) Other monetary financial institutions 3) Other financial intermediaries 4) Financial auxiliaries 5) Insurance corporations and pension funds III. General government 1) Central government 2) Local government 3) Social security funds IV. Households V. Nonprofit institutions serving households VI. Rest of the world	VI. Rest of the world	II. 2) Other monetary financial institutions	III. General government (1+2+3)	II. 1) Central Bank	III. 5) Insurance corporations and pension funds	3) Other financial intermediaries 4) Financial auxiliaries	IV. Households V. Nonprofit institutions serving households	I. Nonfinancial corporations	VI. Rest of the world
	Iceland	I. Banks & Saving Banks II. Miscellaneous credit undertakings III. Mutual and inv funds IV. Pension Funds V. Firms VI. Households VII. Others VIII. Foreign investors	VIII. Foreign investors	I. Banks & Saving Banks II. Miscellaneous credit undertakings	N/A	N/A	IV. Pension Funds	III. Mutual and inv funds	VI. Households	V. Firms	VII. Others

Appendix Table 2f : Classification of Investor Holdings based on Original Sources

Region	Country	Debtholder categories provided by the authorities	Non-residents	Banks	State	Central Bank	Insurance and Pension Funds	Investment/Mutual Funds	Households	Non-financial corporations	Other
Non-euro EMEA	Israel	I. Public II. Mutual Funds III. Provident and advanced study funds IV. Pension funds V. Commercial banks VI. Insurance companies VII. Non-residents VIII. Bank of Israel	VII. Non-residents	V. Commercial banks	N/A	VIII. Bank of Israel	III. Provident and advanced study funds IV. Pension funds VI. Insurance companies	II. Mutual Funds	N/A	N/A	I. Public
	Latvia	I. Residents 1. Latvian banks 2. Public enterprises 3. Private enterprises 4. Private persons 5. Other residents 6. State Treasury 7. Bank of Latvia 8. Public funds II. Non-residents 1. Banks in the OECD countries 2. Banks in other countries 3. Public enterprises 4. Private enterprises 5. Private persons 6. Other non-residents	II. Non-residents - all subcategories	1. Latvian banks	2. Public enterprises 6. State Treasury 8. Public funds	7. Bank of Latvia	N/A	N/A	4. Private persons	3. Private enterprises	5. Other residents
	Poland	I. Banks: (1) Total, (2) Deposited by the Ministry of Finance II. Foreign investors III. Insurance funds IV. Pension funds V. Investment funds VI. Individuals VII. Non-financial sector VIII. Others	II. Foreign investors	I. Banks - net of holdings by MoF	N/A	N/A	III. Insurance funds IV. Pension funds	V. Investment funds	VI. Individuals	VII. Non-financial sector	I. Banks - holdings by MoF
	Turkey	I. Banking Sector: 1) Public Banks, 2) Private Banks, 3) Foreign Banks, 4) Development and Investment Banks III. Retail Investors IV. Corporate Investors V. Securities Mutual Funds VI. Non Residents VII. CBRT (Central Bank)	VI. Non Residents	I. Banking Sector: 1) Public Banks, 2) Private Banks, 3) Foreign Banks, 4) Development and Investment Banks	N/A	VII. CBRT (Central Bank)	N/A	V. Securities Mutual Funds	III. Retail Investors	IV. Corporate Investors	N/A

Appendix Table 2g : Classification of Investor Holdings based on Original Sources

Region	Country	Debtholder categories provided by the authorities	Non-residents	Banks	State	Central Bank	Insurance and Pension Funds	Investment/Mutual Funds	Households	Non-financial corporations	Other
Emerging Economies - Latin America	Brazil	I. Proprietary Holdings 1. Domestic Commercial Bank 2. Foreign Commercial Bank 3. Domestic Investment Bank 4. Foreign Investment Banks 5. Domestic Broker / Inter-broker 6. Foreign Broker / Inter-broker 7. Others II. Bound Securities – "securities bound to reserve requirements on savings deposits and time deposits" III. Clients 1. Individuals 2. Non-financial corporates 3. Financial corporates 4. Mutual Funds 5. Other funds	I. Proprietary Holdings: 2. Foreign Commercial Bank 4. Foreign Investment Banks 6. Foreign Broker / Inter-broker	I. Proprietary Holdings: 1. Domestic Commercial Bank 3. Domestic Investment Bank	N/A	N/A	III. Clients 3. Financial corporates	III. Clients: 4. Mutual Funds I. Proprietary Holdings: 5. Domestic Broker / Inter-broker	III. Clients 1. Individuals	III. Clients 2. Non-financial corporates	I. Proprietary Holdings: 7. Others II. Bound Securities III. Clients: 5. Other funds
	Mexico	I. Repos with Banxico II. Banking Sector III. Guarantees Received by Banxico IV. Siefores V. Mutual Funds VI. Insurance and Surety Companies VII. Other Domestic Residents VIII. Foreign Residents	VIII. Foreign Residents	I. Repos with Banxico II. Banking Sector III. Guarantees Received by Banxico	N/A	N/A	IV. Siefores VI. Insurance and Surety Companies	V. Mutual Funds	N/A	N/A	VII. Other Domestic Residents
	Peru	I. No Residentes II. Bancos III. Fondos publicos IV. Fondos privados V. Personas naturales VI. Otros VII. Administradoras de Fondo de Pensiones VIII. Seguros	I. No Residentes	II. Bancos	III. Fondos publicos	N/A	VII. Administradoras de Fondo de Pensiones VIII. Seguros	IV. Fondos privados	V. Personas naturales	N/A	VI. Otros
Emerging E	South Africa	I. Public Investment Corporation II. Monetary authority III. Banks IV. Non-monetary private sector	N/A	III. Banks	N/A	II. Monetary authority	I. Public Investment Corporation	N/A	N/A	N/A	IV. Non-monetary private sector

Appendix Table 3 Classification of Investor Categories for different datasets

Tomasz Orpiszewski (2012)	**Brugel (2012)**	**IMF (2012)**
Non-residents	Non-Residents	Non-resident investors
Banks	Resident Banks	Banks
General Government	Other Public Institutions	Public sector
Central Bank	Central Bank	
Insurance and Pension Funds		Private non-bank financial institutions
Investment/Mutual Funds		
Households		
Non-financial corporations		
Other	Other Residents	

Note: At several instances the dataset compiled by Brugel includes further country-specific distinctions for insurance and pension funds, households and related non-profit institutions, investment institutions, monetary financial institutions, etc.

Appendix Table 4: Classification differences in datasets

Country	Tomasz Orpiszewski	Brugel	IMF
Italy	Bank of Italy BOP Statistics mention only central government	General Government	General Government
Italy	Bank of Italy BOP Statistics mention nominal valuation		Market Rate
Germany	Series starting from 2005	Series starting from 1992	
Portugal	Central Government Debt	General Government	General Government
Spain	Notes attached to the dataset provided by the Bank of Spain indicate nominal valuation		
Spain		Inconsistencies found in reporting of the debt stock held by the central bank	
US	General Government		Federal Government Debt reported as Central Government Debt

Appendix Table 5: Comparaison of dataset coverage

Country	Orpiszewski (2013)	Merler and Pisani-Ferry, Bruegel	Andritzky, IMF (2012)	Arslanalp and Takahiro, IMF
Australia	-	-	Quarterly	Quarterly
Austria	-	-	-	Quarterly
Belgium	-	Annual	-	Quarterly
Brazil	Monthly	-	-	Quarterly
Canada	-	-	Quarterly	Quarterly
Czech Republic	Monthly	-	-	Quarterly
Denmark	Monthly	-	-	Quarterly
Finland	-	Annual	-	Quarterly
France	Monthly	Quarterly	Quarterly	Quarterly
Germany	Quarterly	Quarterly	Quarterly	Quarterly
Greece	Quarterly	Quarterly	Quarterly	Quarterly
Ireland	Quarterly	Quarterly	Quarterly	Quarterly
Italy	Monthly	Quarterly	Quarterly	Quarterly
Japan	Quarterly	-	Quarterly	Quarterly
Korea	-	-	Quarterly	Quarterly
Netherlands	Quarterly	Quarterly	Quarterly	Quarterly
New Zealand	-	-	-	Quarterly
Norway	-	-	-	Quarterly
Portugal	Quarterly	Annual	Quarterly	Quarterly
Slovenia	-	-	-	Quarterly
Switzerland	-			Quarterly
UK	Quarterly	Quarterly	Quarterly	Quarterly
US	Quarterly	Quarterly	Quarterly	Quarterly
Spain	Monthly	Quarterly	Quarterly	Quarterly
Hungary	Quarterly	-	-	-
Iceland	Monthly	-	-	-
India	Quarterly	-	-	-
Indonesia	Monthly	-	-	-
Israel	Monthly	-	-	-
Latvia	Monthly	-	-	-
Malaysia	Quarterly	-	-	-
Mexico	Monthly	-	-	-
Peru	Monthly	-	-	-
Poland	Monthly	-	-	-
South Africa	Monthly	-	-	-
Thailand	Monthly	-	-	-
Turkey	Monthly	-	-	-
Bulgaria	Quarterly	-	-	

Appendix Table 6: Sovereign Ratings conversion Table

Rating	Score	Rating	Score	Rating	Score
AAA	100	BBB+	67	B-	29
AA+	95	BBB	62	CCC+	24
AA	90	BBB-	57	CCC	19
AA-	86	BB+	52	CCC-	14
A+	81	BB	48	CC	10
A	76	BB-	43	C	5
A-	71	B+	38	DDD and below	0
		B	33		

Appendix Table 7 : Econometric Tests

		Official Non-residents	Private Non-residents	Banks	Insurance and Pension Funds	Investment/Mutual Funds	General Government
AUTOCORRELATION							
Wooldridge test for autocorrelation in panel data	F-statistic	76.75	113.87	29.19	99.34	60.39	20.46
H0: no first-order autocorrelation	Prob > F	0	0	0	0	0	0
Presence of Autocorrelation		Yes	Yes	Yes	Yes	Yes	Yes
TIME TREND							
Time Trend on Least Squares Dummy Variable	Chi2	51.76	95.05	33.75	67.53	135.82	133.77
H0: All years coefficients are equal zero	Prob > Chi2	0.737	0	0.99	0.21	0	0
Time fixed effects needed		No	Yes	No	No	Yes	Yes
UNIT ROOT							
A. Test in Level							
Fisher-type unit-root test based on augmented Dickey-Fuller tests under consideration of panel means	Chi2	42	17	91	126	75	50
Ho: All panels contain unit roots							
Ha: At least one panel is stationary	P-value with time trend	0.86	1	0	0	0	0.03
	P-value without time trend	0.51	0.95	0.09	0.05	0	0.33
Im-Pesaran-Shin unit-root test under consideration of panel means	Z-t-tilde-bar	-1.52	4.83	-3.9	-3.8	-2.66	-3.75
Ho: All panels contain unit roots							
Ha: Some panels are stationary	P-value with time trend	0.06	1	0	0	0	0
	P-value without time trend	0.52	1	0.11	0.75	0.58	0.9
Presence of Unit Root		Yes	Yes	Yes	Yes	No	No
B. Test in First Difference							
Fisher-type unit-root test based on augmented Dickey-Fuller tests under consideration of panel means							
Ho: All panels contain unit roots							
Ha: At least one panel is stationary	P-value with time trend	0	0	0	0	0	0
	P-value without time trend	0	0	0	0	0	0
Im-Pesaran-Shin unit-root test under consideration of panel means	P-value with time trend	0	0	0	0	0	0
Ho: All panels contain unit roots							
Ha: Some panels are stationary	P-value without time trend	0	0	0	0	0	0
Presence of Unit Root		No	No	No	No	No	No
CROSS-SECTION							
Cross-section dependence Average correlation coefficients & Pesaran (2004) CD test							
H0: cross-section independence CD ~ N(0,1)							
Dependent variable (xtcd)	P-value	0	n/a	0	n/a	n/a	n/a
All variables (xtcsd) under fixed effects	P-value	0.01	0	n/a	0.12	0.18	0.02
All variables (xtcsd) under LSDV	P-value	0.43	0	0.43	0.45	0.39	n/a
All variables (xtcsd) under LSDV and time effects	P-value	0.33	0	0	0	0	0.12
Cross-section independence present		Unclear	Unclear	Unclear	Unclear	Unclear	Unclear

Appendix Table 8 Clemente-Montañés-Reyes Unit Root Test under unidentified breaks for *Non-resident Private Investors*

	AO Single		IO Single		AO Double		IO Double	
Country	Min T-	Unit	Min T-	Unit	Min T-	Unit	Min T-	Unit
Czech Republic	- 4.35	No	- 4.31	No	- 2.32	Yes	- 5.03	Yes
Denmark	- 2.55	Yes	- 3.54	Yes	- 0.44	Yes	- 5.27	Yes
France	- 2.38	Yes	- 2.86	Yes	- 3.17	Yes	- 2.60	Yes
Germany	- 2.99	Yes	- 2.63	Yes	- 1.85	Yes	- 2.84	Yes
Greece	- 3.33	Yes	- 4.10	Yes	- 2.79	Yes	- 5.54	No
Hungary	- 2.75	Yes	- 1.79	Yes	- 3.57	Yes	- 2.99	Yes
Indonesia	- 1.70	Yes	- 1.60	Yes	- 4.75	Yes	- 5.37	Yes
Ireland	- 1.97	Yes	- 2.94	Yes	- 2.69	Yes	- 5.68	No
Italy	- 3.26	Yes	- 2.23	Yes	- 3.72	Yes	- 2.23	Yes
Japan	- 3.03	Yes	- 1.57	Yes	- 3.01	Yes	- 2.98	Yes
Mexico	- 1.97	Yes	- 0.19	Yes	- 3.90	Yes	- 5.24	Yes
Malaysia	- 2.16	Yes	- 1.52	Yes	- 2.60	Yes	- 3.18	Yes
Poland	- 3.58	No	- 3.72	Yes	- 3.57	Yes	- 4.92	Yes
Spain	- 3.78	No	- 2.32	Yes	- 3.94	Yes	- 2.21	Yes
UK	- 2.34	Yes	- 2.42	Yes	- 3.67	Yes	- 3.40	Yes
US	- 3.71	No	- 3.43	Yes	- 4.22	Yes	- 3.25	Yes

Note: Tests are conducted under single and double unidentified breaks for presence of Additive Outliers (AO) and Innovative Outlier tests (IO). Critical value at 5% level. H0: series contain a unit root, H0: no unit root

Appendix Table 9 Clemente-Montañés-Reyes Unit Root Test under unidentified breaks for *Non-resident Official Investors*

	AO Single		IO Single		AO Double		IO Double	
Country	Min T-	Unit	Min T-	Unit	Min T-	Unit	Min T-	Unit
Czech Republic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	N/A	N/A	- 2.62	Yes	- 2.10	Yes	- 2.62	Yes
France	- 2.63	Yes	- 2.61	Yes	- 4.05	Yes	- 2.94	Yes
Germany	- 2.81	Yes	- 2.02	Yes	- 2.88	Yes	- 1.40	Yes
Greece	- 2.22	Yes	- 2.46	Yes	- 3.22	Yes	- 6.92	No
Hungary	- 2.03	Yes	- 2.31	Yes	- 2.06	Yes	- 12.67	No
Indonesia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ireland	- 1.49	Yes	- 1.43	Yes	- 2.71	Yes	- 3.72	Yes
Italy	- 2.73	Yes	- 3.80	Yes	- 1.83	Yes	- 4.46	Yes
Japan	- 1.49	Yes	- 4.84	No	- 5.04	Yes	- 5.14	Yes
Mexico	- 1.46	Yes	- 3.13	Yes	- 2.97	Yes	- 5.77	No
Malaysia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Poland	- 3.06	Yes	- 5.04	No	.		- 19.19	No
Spain	- 1.84	Yes	- 2.79	Yes	- 1.82	Yes	- 2.10	Yes
UK	- 2.22	Yes	- 3.40	Yes	- 3.13	Yes	- 4.15	Yes
US	- 1.72	Yes	- 1.92	Yes	- 2.79	Yes	- 2.81	Yes

Note: Tests are conducted under single and double unidentified breaks for presence of Additive Outliers (AO) and Innovative Outlier tests (IO). Critical value at 5% level. H0: series contain a unit root, H0: no unit root

Appendix Table 10 Clemente-Montañés-Reyes Unit Root Test under unidentified breaks for *Domestic Banks*

	AO Single		IO Single		AO Double		IO Double	
Country	Min T-	Unit	Min T-	Unit	Min T-	Unit	Min T-	Unit
Czech Republic	- 2.98	Yes	- 4.23	Yes	- 2.44	Yes	- 4.49	Yes
Denmark	- 2.10	Yes	- 5.03	No	- 3.17	Yes	- 5.27	Yes
France	- 2.13	Yes	- 2.51	Yes	- 3.37	Yes	- 5.62	No
Germany	- 3.42	Yes	- 3.61	Yes	- 3.59	Yes	- 4.15	Yes
Greece	- 1.74	Yes	- 2.94	Yes	- 1.70	Yes	- 2.75	Yes
Hungary	- 4.35	No	- 4.38	No	- 0.17	Yes	- 5.61	No
Indonesia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ireland	- 1.94	Yes	- 1.90	Yes	- 3.74	Yes	- 2.60	Yes
Italy	- 1.73	Yes	- 1.75	Yes	- 3.52	Yes	- 3.08	Yes
Japan	- 0.68	Yes	- 2.54	Yes	- 4.97	Yes	- 4.84	Yes
Mexico	- 3.74	No	- 3.46	Yes	- 3.87	Yes	- 3.95	Yes
Malaysia	- 2.27	Yes	- 2.99	Yes	- 2.33	Yes	- 4.67	Yes
Poland	- 3.50	Yes	- 3.92	Yes	- 2.34	Yes	- 4.85	Yes
Spain	- 1.25	Yes	- 1.66	Yes	- 2.67	Yes	- 1.01	Yes
UK	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
US	- 1.31	Yes	- 4.05	Yes	- 2.53	Yes	- 3.18	Yes

Note: Tests are conducted under single and double unidentified breaks for presence of Additive Outliers (AO) and Innovative Outlier tests (IO). Critical value at 5% level. H0: series contain a unit root, H0: no unit root

Appendix Table 11 Clemente-Montañés-Reyes Unit Root Test under unidentified breaks for *Dom. Pensions and Insurance Funds*

	AO Single		IO Single		AO Double		IO Double	
Country	Min T-	Unit	Min T-	Unit	Min T-	Unit	Min T-	Unit
Czech Republic	- 2.73	Yes	- 3.68	Yes	- 3.25	Yes	- 5.26	Yes
Denmark	- 1.40	Yes	- 4.77	No	- 1.62	Yes	- 7.16	No
France	- 2.78	Yes	- 4.48	No	- 3.77	Yes	- 4.54	Yes
Germany	- 4.02	No	- 8.67	No	- 2.95	Yes	- 9.40	No
Greece	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hungary	- 1.25	Yes	- 3.15	Yes	- 3.29	Yes	- 4.52	Yes
Indonesia	- 4.78	No	- 3.64	Yes	- 5.95	No	- 4.69	Yes
Ireland	- 4.69	No	- 6.10	No	- 3.34	Yes	- 3.04	Yes
Italy	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Japan	- 3.01	Yes	- 3.46	Yes	- 3.18	Yes	- 4.24	Yes
Mexico	- 1.36	Yes	- 4.57	No	- 4.28	Yes	- 4.69	Yes
Malaysia	- 2.57	Yes	- 2.06	Yes	- 1.48	Yes	- 2.63	Yes
Poland	- 1.59	Yes	- 4.00	Yes	- 2.06	Yes	- 4.87	Yes
Spain	- 3.14	Yes	- 5.78	No	- 3.95	Yes	- 6.89	No
UK	- 3.17	Yes	- 3.06	Yes	- 1.52	Yes	- 4.14	Yes
US	- 4.02	No	- 4.52	No	- 3.11	Yes	- 5.48	Yes

Note: Tests are conducted under single and double unidentified breaks for presence of Additive Outliers (AO) and Innovative Outlier tests (IO). Critical value at 5% level. H0: series contain a unit root, H0: no unit root

Appendix Table 12 Clemente-Montañés-Reyes Unit Root Test under unidentified breaks for *Domestic Investment Funds*

	AO Single		IO Single		AO Double		IO Double	
Country	Min T-	Unit	Min T-	Unit	Min T-	Unit	Min T-	Unit
Czech Republic	- 3.21	Yes	- 4.31	No	- 4.31	Yes	- 4.31	Yes
Denmark	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
France	- 3.19	Yes	- 3.13	Yes	- 4.37	Yes	- 3.88	Yes
Germany	- 2.62	Yes	- 8.35	No	- 4.33	Yes	- 9.36	No
Greece	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hungary	- 3.90	No	- 2.49	Yes	- 3.67	Yes	- 5.03	Yes
Indonesia	- 2.06	Yes	- 1.88	Yes	- 4.89	Yes	- 3.96	Yes
Ireland	- 0.44	Yes	- 6.23	No	- 1.50	Yes	- 9.00	No
Italy	- 3.48	Yes	- 3.23	Yes	- 1.91	Yes	- 3.12	Yes
Japan	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mexico	- 1.50	Yes	- 7.69	No	- 6.57	No	- 11.50	No
Malaysia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Poland	- 0.90	Yes	- 0.46	Yes	- 1.11	Yes	- 5.88	No
Spain	0.01	Yes	- 2.37	Yes	0.25	Yes	- 4.27	Yes
UK	- 2.51	Yes	- 2.16	Yes	- 2.81	Yes	- 3.86	Yes
US	- 3.18	Yes	- 3.10	Yes	- 4.12	Yes	- 4.07	Yes

Note: Tests are conducted under single and double unidentified breaks for presence of Additive Outliers (AO) and Innovative Outlier tests (IO). Critical value at 5% level. H0: series contain a unit root, H0: no unit root

Appendix Table 13 Clemente-Montañés-Reyes Unit Root Test: Identified Breaks with corresponding p-values with for *Non-resident Private Investors*

	P-value						Structural Break Date					
Country	AO Single	IO Single	AO Double		IO Double		AO Single	IO Single	AO Double		IO Double	
Czech Republic	0.00	0.00	0.02	0.00	0.02	0.02	2004q2	2003q3	2003q2	2004q2	2003q3	2004q2
Denmark	0.72	0.74	0.01	0.00	0.00	0.00	2011q2	2008q1	2006q4	2009q1	2006q3	2008q2
France	0.00	0.04	0.00	0.00	#N/A	#N/A	2004q3	2003q3	2005q1	2009q2	2000q2	2004q3
Germany	0.00	0.01	0.00	0.79	0.30	0.30	2005q1	2005q2	2005q1	2008q2	2001q4	2005q2
Greece	0.00	0.00	0.00	0.00	0.00	0.00	2004q2	2003q2	2004q2	2006q3	2003q2	2011q1
Hungary	0.00	0.37	0.00	0.00	#N/A	#N/A	2011q4	1999q2	2001q3	2011q4	1999q2	2010q4
Indonesia	0.00	0.19	0.00	0.00	0.00	0.00	2007q3	2009q3	2006q2	2010q3	2005q2	2009q3
Ireland	0.00	0.08	0.00	0.00	0.01	0.01	2005q4	2005q3	2005q4	2011q1	2004q3	2009q4
Italy	0.00	0.04	0.00	0.00	#N/A	#N/A	2003q4	2004q3	1999q4	2005q2	1999q3	2004q3
Japan	0.01	0.94	0.00	0.00	0.02	0.02	2011q2	1998q3	2001q1	2006q1	2001q2	2005q4
Mexico	0.00	0.44	0.00	0.00	0.00	0.00	2011q2	2003q3	2004q2	2010q2	2003q3	2010q2
Malaysia	0.00	0.00	0.00	0.00	0.00	0.00	2008q3	2008q4	2006q4	2010q2	2005q4	2009q3
Poland	0.00	0.00	0.00	0.00	0.01	0.01	2010q4	2010q1	2002q4	2010q4	2003q2	2010q1
Spain	0.00	#N/A	0.00	0.00	#N/A	#N/A	1999q4	1998q3	1999q2	2010q1	1998q3	2009q1
UK	0.00	0.01	0.00	0.00	0.02	0.02	2005q4	2005q1	1999q4	2005q4	1997q1	2005q1
US	0.01	0.19	0.01	0.00	0.03	0.03	2009q3	2007q1	2006q3	2008q2	2005q4	2008q1

Note: Tests are conducted under single and double unidentified breaks for presence of Additive Outliers (AO) and Innovative Outlier tests (IO). H0:

Appendix Table 14 Clemente-Montañés-Reyes Unit Root Test: Identified Breaks with corresponding p-values with for *Non-resident Private Investors*

	P-value						Structural Break Date					
Country	AO Single	IO Single	AO Double		IO Double		AO Single	IO Single	AO Double		IO Double	
Czech Republic	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Denmark	#N/A	0.01	0.14	0.00	#N/A	#N/A	#N/A	2008q3	2006q3	2008q4	2001q3	2008q3
France	0.00	0.00	0.00	0.00	0.16	0.16	2010q3	2008q1	2004q1	2010q3	2001q3	2008q1
Germany	0.00	0.17	0.03	0.00	0.21	0.21	2006q3	2006q3	2004q3	2007q3	2006q2	2008q1
Greece	0.01	0.22	0.00	0.00	0.00	0.00	2011q2	2003q3	2003q4	2010q2	2003q3	2010q1
Hungary	0.00	0.17	0.00	0.00	0.00	0.00	2004q1	2004q2	2004q1	2010q2	2004q2	2009q3
Indonesia	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Ireland	0.92	0.03	0.00	0.00	0.00	0.00	2008q1	2008q2	2005q3	2009q2	2004q3	2008q2
Italy	0.00	0.01	0.00	0.02	0.00	0.00	2000q2	1998q2	2000q2	2009q2	1998q2	2007q3
Japan	0.00	0.00	0.00	0.00	0.00	0.00	2001q1	2001q2	2001q1	2008q2	2001q2	2008q3
Mexico	0.00	0.52	0.00	0.00	0.00	0.00	2007q1	2007q3	2007q1	2009q3	2007q2	2009q2
Malaysia	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Poland	0.00	0.16	0.00	0.00	0.00	0.00	2005q1	2005q3	2005q3	2007q1	2005q2	2007q1
Spain	0.05	0.04	0.00	0.00	0.02	0.02	2011q4	2005q3	2008q1	2011q3	2005q3	2010q1
UK	0.00	0.01	0.00	0.00	0.00	0.00	2002q2	1997q2	1999q4	2006q2	1997q2	2004q4
US	0.00	0.00	0.00	0.00	0.02	0.02	2007q4	2003q1	2004q3	2008q4	2003q1	2009q2

Note: Tests are conducted under single and double unidentified breaks for presence of Additive Outliers (AO) and Innovative Outlier tests (IO)

Appendix Table 15 Clemente-Montañés-Reyes Unit Root Test: Identified Breaks with corresponding p-values with for *Domestic Banks*

	P-value						Structural Break Date					
Country	AO Single	IO Single	AO Double		IO Double		AO Single	IO Single	AO Double		IO Double	
Czech Republic	0.00	0.00	0.68	0.00	0.00	0.00	2003q4	2003q3	1999q4	2004q1	1999q2	2003q3
Denmark	0.00	0.00	0.00	0.00	0.26	0.26	2004q4	2005q1	2004q4	2006q2	2000q3	2005q1
France	0.00	0.34	0.00	0.00	0.00	0.00	2004q2	2000q2	2005q3	2008q1	2004q4	2007q4
Germany	0.00	0.00	0.00	0.00	0.12	0.12	2006q2	2005q2	2005q1	2006q4	2001q4	2005q2
Greece	0.00	0.05	0.00	0.00	.	.	2002q1	1999q2	2000q4	2003q3	1999q2	2001q1
Hungary	0.00	0.00	0.05	0.00	0.14	0.14	2008q1	2007q3	2005q1	2008q1	1998q3	2007q3
Indonesia	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Ireland	0.08	0.05	0.00	0.00	0.03	0.03	2011q2	2011q2	2004q3	2009q3	2006q3	2008q2
Italy	0.10	.	0.00	0.00	0.08	0.08	2010q3	1999q1	2002q1	2009q2	2002q1	2008q3
Japan	0.00	.	0.00	0.00	0.00	0.00	2001q1	1999q1	2002q2	2009q1	1999q1	2002q3
Mexico	0.00	0.00	0.42	0.00	0.16	0.16	2005q4	2004q3	2004q2	2005q4	2000q3	2004q3
Malaysia	0.00	0.02	0.00	0.04	0.00	0.00	2000q1	1999q1	2000q1	2007q4	2000q1	2008q1
Poland	0.00	0.05	0.00	0.00	0.00	0.00	2003q1	2003q4	2004q3	2008q1	2003q4	2007q2
Spain	0.00	0.00	0.00	0.28	0.00	0.00	2008q3	2008q3	2008q3	2010q3	2008q4	2010q2
UK	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
US	0.00	0.00	0.00	0.00	.	.	2003q3	2002q3	2003q3	2009q4	2002q3	2009q1

Note: Tests are conducted under single and double unidentified breaks for presence of Additive Outliers (AO) and Innovative Outlier tests (IO)

Appendix Table 16 Clemente-Montañés-Reyes Unit Root Test: Identified Breaks with corresponding p-values with for *Domestic Pensions and Insurance Funds*

	P-value						Structural Break Date					
Country	AO Single	IO Single	AO Double		IO Double		AO Single	IO Single	AO Double		IO Double	
Czech Republic	0.00	0.01	0.00	0.00	0.00	0.00	2006q4	1997q3	1997q2	2006q2	1997q3	2005q3
Denmark	0.00	0.00	0.00	0.00	0.00	0.00	2008q1	2008q2	2003q1	2009q1	2003q1	2008q2
France	0.00	0.00	0.00	0.00	#N/A	#N/A	2005q4	2006q1	2003q1	2007q3	2002q1	2006q1
Germany	0.00	0.00	0.00	0.00	#N/A	#N/A	2005q1	2005q2	2005q1	2006q1	2001q4	2005q2
Greece	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Hungary	0.04	0.00	0.00	0.00	0.00	0.00	2011q4	2010q4	2004q1	2011q3	2004q1	2010q4
Indonesia	0.02	0.90	0.00	0.19	0.04	0.04	2009q3	2011q4	2009q2	2011q3	2009q1	2011q4
Ireland	0.00	0.01	0.01	0.10	0.80	0.80	2010q1	2009q4	2003q4	2010q3	2008q4	2010q1
Italy	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Japan	0.00	0.00	0.00	0.00	0.01	0.01	2008q2	2007q4	2007q2	2009q3	2006q1	2008q3
Mexico	0.00	0.00	0.00	0.00	0.00	0.00	2004q4	2004q2	2004q1	2010q1	2004q2	2009q4
Malaysia	0.00	0.01	0.00	0.00	0.02	0.02	2009q1	2008q2	2007q4	2010q4	2004q1	2008q2
Poland	0.00	0.21	0.00	0.04	0.01	0.01	2003q4	2005q1	2006q3	2009q4	2005q1	2009q2
Spain	0.00	0.00	0.00	0.00	0.00	0.00	2007q2	2007q3	2008q3	2010q4	2003q4	2007q3
UK	0.00	0.00	0.00	0.00	0.00	0.00	2007q4	2008q1	2006q3	2008q4	2006q2	2008q1
US	0.00	0.00	0.00	0.01	0.00	0.00	2009q4	2009q1	2009q3	2010q4	2009q1	2009q4

Note: Tests are conducted under single and double unidentified breaks for presence of Additive Outliers (AO) and Innovative Outlier tests (IO)

Table 17 Clemente-Montañés-Reyes Unit Root Test: Identified Breaks with corresponding p-values with for *Domestic Investment Funds*

	P-value						Structural Break Date					
Country	AO Single	IO Single	AO Double		IO Double		AO Single	IO Single	AO Double		IO Double	
Czech Republic	0.00	0.00	0.00	0.00	#N/A	#N/A	2008q1	2007q1	1998q2	2007q2	1997q3	2007q1
Denmark	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
France	0.00	0.01	0.00	0.00	0.03	0.03	2008q2	2008q1	2003q1	2008q2	2001q4	2008q1
Germany	0.00	0.00	0.00	0.00	0.09	0.09	2006q1	2005q2	2005q1	2007q2	2001q4	2005q2
Greece	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Hungary	0.00	0.07	0.00	0.00	0.00	0.00	2004q2	2003q1	2004q1	2008q1	2003q1	2008q2
Indonesia	0.05	0.19	0.00	0.00	0.01	0.01	2011q3	2011q2	2009q2	2011q2	2009q3	2011q1
Ireland	0.00	0.00	0.00	0.00	0.00	0.00	2004q4	2005q2	2004q4	2006q1	2003q4	2005q2
Italy	0.00	0.00	0.00	0.00	0.03	0.03	2006q3	2004q2	2000q2	2006q2	1999q1	2004q3
Japan	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Mexico	0.00	0.00	0.00	0.00	0.00	0.00	2005q4	2005q1	2005q4	2010q1	2005q1	2010q2
Malaysia	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Poland	0.26	0.00	0.00	0.00	0.00	0.00	2006q3	2007q2	2005q4	2008q2	2005q1	2007q2
Spain	0.00	.	0.00	0.00	.	.	1999q4	1998q2	1999q4	2008q2	1998q3	2007q4
UK	0.00	0.15	0.00	0.00	0.00	0.00	2001q2	1999q4	2006q2	2010q2	2005q3	2008q3
US	0.00	0.01	0.00	0.00	0.02	0.02	2008q2	2007q1	2004q3	2008q2	2003q4	2007q3

Note: Tests are conducted under single and double unidentified breaks for presence of Additive Outliers (AO) and Innovative Outlier tests (IO)

Appendix Table 18 Fisher-type Unit- root Test based on Phillips-Perron Tests

Variable	Inverse chi-squared		Inverse normal		Inverse logit		Modified inv. chi-squared		Presumable Unit Root
	Intercept Only	Time Trend	Intercept Only	Time Trend	Intercept Only	Time Trend	Intercept Only	Time Trend	
Non-resident Private	0.98 (16.33)	1.00 (7.57)	0.96 (-1.76)	1.00 (-2.90)	0.99 (2.59)	1.00 (4.13)	0.99 (2.44)	1.00 (4.01)	Yes
Non-resident Official	1.00 (10.86)	1.00 (11.87)	0.99 (-2.47)	0.99 (-2.34)	0.99 (2.36)	1.00 (3.61)	0.99 (2.31)	1.00 (3.38)	Yes
Banks	0.76 (24.37)	0.91 (20.39)	0.77 (-0.73)	0.89 (-1.24)	0.66 (0.42)	0.95 (1.69)	0.65 (0.38)	0.96 (1.72)	Yes
Pension and Insurance Funds	0.89 (19.11)	0.69 (23.76)	0.88 (-1.19)	0.71 (-0.57)	0.99 (2.37)	0.91 (1.33)	0.99 (2.21)	0.89 (1.23)	Yes
Investment Funds	1.00 (11.12)	0.75 (20.93)	0.98 (-2.06)	0.76 (-0.70)	0.96 (1.81)	0.85 (1.04)	0.97 (1.84)	0.85 (1.06)	Yes
Structural Primary Fiscal Balance	0.98 (19.07)	1.00 (3.01)	0.96 (-1.81)	1.00 (-3.76)	0.99 (2.56)	1.00 (6.13)	1.00 (2.59)	1.00 (6.02)	Yes
Debt / GDP	0.00 (94.24)	1.00 (5.05)	0.00 (7.31)	1.00 (-3.51)	0.00 (-3.75)	1.00 (6.13)	0.00 (-2.93)	1.00 (5.70)	Yes
Wght-Av. Debt Maturity	0.16 (39.83)	1.00 (12.10)	0.16 (0.98)	0.99 (-2.49)	0.67 (0.44)	1.00 (5.10)	0.70 (0.53)	1.00 (4.73)	Yes
GDP Growth Trend	0.79 (27.26)	1.00 (6.34)	0.79 (-0.82)	1.00 (-3.35)	0.91 (1.37)	1.00 (6.01)	0.97 (1.93)	1.00 (5.99)	Yes
Current Account Balance / GDP	0.00 (88.24)	0.00 (87.34)	0.00 (6.58)	0.00 (6.47)	0.00 (-4.77)	0.00 (-4.36)	0.00 (-4.03)	0.00 (-3.55)	No
S&P Rating	0.97 (20.62)	1.00 (15.49)	0.95 (-1.62)	0.99 (-2.24)	0.60 (0.25)	1.00 (2.71)	0.61 (0.29)	1.00 (2.58)	Yes
Risk Aversion Index	0.70 (29.32)	0.16 (42.13)	0.71 (-0.57)	0.16 (0.99)	0.24 (-0.72)	0.02 (-2.05)	0.21 (-0.81)	0.01 (-2.29)	Yes
Average Bid-Ask Spread	0.00 (89.35)	0.00 (74.35)	0.00 (6.71)	0.00 (4.89)	0.00 (-4.06)	0.02 (-2.00)	0.00 (-3.03)	0.07 (-1.46)	No
Inflation (CPI)	0.05 (48.95)	0.78 (27.52)	0.03 (1.81)	0.78 (-0.79)	0.01 (-2.35)	0.52 (0.06)	0.01 (-2.52)	0.51 (0.03)	Yes
Credit to Private Sector / GDP	0.49 (33.62)	0.00 (60.44)	0.52 (-0.05)	0.00 (3.21)	0.28 (-0.58)	0.04 (-1.76)	0.30 (-0.53)	0.03 (-1.82)	Yes
European Policy Uncertainty	0.00 (83.02)	0.00 (116.13)	0.00 (5.94)	0.00 (9.96)	0.00 (-5.37)	0.00 (-7.73)	0.00 (-5.60)	0.00 (-7.59)	No
Government Effectiveness	0.34 (36.85)	0.98 (19.50)	0.37 (0.35)	0.96 (-1.76)	0.87 (1.11)	1.00 (3.83)	0.92 (1.43)	1.00 (3.64)	Yes
Sovereign Spread	0.02 (54.16)	0.06 (47.27)	0.01 (2.45)	0.05 (1.61)	0.61 (0.29)	0.21 (-0.82)	0.75 (0.67)	0.35 (-0.40)	Yes
Currency Appreciation	0.00 (511.05)	0.00 (449.65)	0.00 (57.85)	0.00 (50.40)	0.00 (-35.43)	0.00 (-31.18)	0.00 (-20.49)	0.00 (-18.92)	No

Note: Ho: All panels contain unit roots. Ha: At least one panel is stationary. Results contain p-values followed by corresponding statistic values in brackets.

ARTICLE 2

Impact of sovereign credit downgrades on investor holdings of government debt in developed and emerging economies[17]

Abstract

Using a new broad dataset compiled from national sources, this paper analyzes the impact of changes in sovereign credit ratings on investor holdings of sovereign debt and on sovereign bond yields. Findings for the broad country sample indicate that upgrades exert no consistent and significant impact on bond holdings nor on bond yields, whereas rating downgrades induce volatility in sovereign yields and bondholdings of domestic banks, pension funds and investment funds. In case of Eurozone Periphery and Emerging Economies, upgrades that occurred before and after the sovereign crisis influenced the holdings of domestic investors, but not the bond prices. In Peripheral Eurozone, holdings of non-resident investors and non-resident central banks as well as sovereign yields were impacted by the rating downgrades, in particular those issued by S&P and Moody's together with serial downgrades that took place over a short time period.

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Keywords: Sovereign risk, public domestic debt, credit ratings, credit default swaps, emerging economies, Eurozone economies

JEL Classification: F34, G15, H63

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I. Introduction

Credit rating agencies have played a crucial role in shaping global financial markets over the last two decades, as sovereign ratings provide objective and valuable information of riskiness and repayment probability of sovereigns. This is why financial press, policymakers and investors pay close attention to the actions and inactions of rating agencies in turbulent times, when political risk and uncertainty of debt repayment move into alarming levels. Occasionally public opinion and policymakers criticize rating agencies for issuing excessively negative ratings that supposedly cause panic in financial markets, push investors to sell downgraded sovereign bonds and rise governments' refinancing costs.

To date empirical research focused on measuring the reaction of asset prices to changes in credit ratings. The objective of this study is to analyse the impact of rating changes on both bond yield and the actual holdings of government for different investor types. For the purpose of this paper a new dataset has been compiled to gauge the holdings of non-resident private investors, non-resident central banks as well as domestic banks, domestic pension and insurance funds, and domestic investment funds. The data has been compiled from national sources for a set of 24 countries from Core and Peripheral Eurozone, so-called Safe Haven developed countries, and emerging economies of different size and level of development. Econometric analysis is conducted under consideration for different country types and rating agencies, anticipative effects related to rating outlooks, and general vs. serial rating changes vs. multi-notch rating changes. The main results are as follows.

Findings for the full sample indicate that upgrades exert no consistent and significant impact either neither on investor holdings nor on bond yields, no matter whether they are preceded by an outlook warning or not. However, in case of Peripheral Eurozone and Emerging Economies rating upgrades pushed domestic asset managers and pension funds to change their allocation to domestic government bonds.

In line with existing literature results for the full sample indicate that sovereign yields and all types of domestic investors are affected by rating downgrades, in particular those preceded by negative outlooks. In case of Eurozone Periphery and Emerging Economies, foreign private investors and sovereign yields were influenced in particular by the second and third downgrades over two-year horizon.

Downgrades by S&P and Moody's in Peripheral Eurozone were associated not only with significant changes in holdings among non-resident private investors and non-resident central banks, but also with changes in bond yields. In Emerging Economies, downgrades by Fitch affected the holdings of foreign investors, domestic banks and pension funds, and sovereign bonds. Last but not least, investors in Emerging Economies reacted differently to 1st and 3rd downgrades over a two year horizon and to multi-notch downgrades.

From a policy-making and investment point of view, to safeguard the stability of the international financial system, the key priorities are to reduce the sovereign solvency risk and to tackle contagion, as pointed out by Santis (2012) among others. Presented analysis indicates that rating changes not only affect the bond yields, but more importantly they affect the structure of investor holdings. Although at this stage of research the holdings-yields relationship has not been entirely identified, it is conceivable that a durable change in demand for government bonds may change the level and volatility of bond yields and, in consequence, country's debt sustainability in the long run.

II. Literature Review

II.1. Credit Ratings, Investment Rationale and Financial Regulation

Banks, pension funds and investment funds have different investment rationale and face different constrains for holding government bonds.

Banks allocate certain portion of their assets in government bonds as a liquidity buffer. Nouy (2011) argues that regulators have by far neglected the riskiness of government bonds. In fact, under Basel I, II and III, domestic-currency government bonds of OECD countries are assigned zero risk capital weights irrespective of the actual credit rating. This explains why high-yielding low-rating bonds remain highly profitable investment from banks' point of view, at least as long as those assets they do not need to be marked to market. On the other hand, low-rated bonds are not eligible as collateral for financing transactions with central banks or at the money market. During episodes of tight financing conditions, holding downgraded bonds in bank portfolio can become more of a burden than a profitable investment.

Pension and insurance funds have buy-and-hold profiles and invest in government bonds to match their long-term liabilities. Institutions operating under the Solvency regulation are obliged by to purchase and hold bonds with a certain minimum rating.

Finally, investment funds invest in bonds according to the specific conditions agreed with the clients. If the investment prospectus restricts investment in bonds below a certain rating, fund manager is obliged to sell those assets in case of a downgrade.

Hypothesis 1: banks, investment funds and pension and insurance funds may need to sell bonds following downgrades

II.2. Impact of Sovereign Credit Ratings on Financial Assets

Numerous studies have investigated the impact of credit ratings on asset prices.

Cantor and Packer (1996) find that credit ratings help to explain sovereign credit ratings beyond publicly available information on fiscal and macroeconomic situation. They find that foreign currency bond spreads are more likely to react to negative rather than positive rating announcements, Moody's to S&P, changes in ratings rather than in outlook, speculative grade rather than investment grade.

Pukthuanthong-Le, Elayan, and Rose (2007) study the impact of changes in ratings and outlook on asset prices between 1990 and 2000 and find that only negative news have an impact on equity and bond returns. They observe that downgrades and negative outlooks occur mainly during bond market downturns, raising probability that rating agencies may exacerbate a bond bear market.

Brooks et al. (2004) look at the reaction of national stock market and find that only downgrades by S&P and Fitch elicit a significant market reaction and that EMs stock markets' reaction is no different from DMs. Also, while rating upgrades and downgrades in local currency ratings pass relatively unperceived, downgrades in foreign currency rating entice a negative market reaction

Reisen and von Maltzan (1999) show that while investors tend to underestimate the signals from credit rating agencies during pre-crisis boom years, downgrades have significant impact on the bond markets and amplify the downward pressure during the bust phase. Through an event study they also show that imminent upgrades and implemented downgrades have a

significant impact on government bonds both in OECD and Emerging countries, the effect being strong in the latter one.

Causation may be transmitted not only from ratings to sovereign spreads, but also from sovereign spreads to ratings. Reisen and von Maltzan (1999) and more recently Afonso, Furceri, and Gomes (2012) show that past values of changes in bond or CDS spreads are significant determinants of the change in ratings and vice-versa.

Ismailescu and Kazemi (2010) apply event study with a two-day window to analyze the relationship between sovereign CDS and sovereign credit ratings in 22 emerging countries between 2001 and 2009 and find that positive rating announcements cause relatively strong turbulence both in the subject country and in other economies, while negative rating signals affect only domestic market and to far lesser extent. Their results also indicate that investors may be able to use changes in CDS spreads to predict rating announcements, in particular negative ones, and that the impact of rating announcements on CDS markets is diminished by prior rating announcements.

Alsakka and ap Gwilym (2013) analyze the impact of rating announcements on exchange rates. They find that signals sent by rating agencies not only affect the exchange rate of the subject country, but also induce strong spillover effects to other countries' exchange rates in the region. Their findings indicate that spillover effects tend to be more intense during crisis episodes. The impact of outlook and watch signals is stronger than the impact of actual rating changes. Negative news from all three major agencies have a market impact, whereas only Moody's positive news produces a reaction.

Hypothesis 2: rating actions, in particular downgrades, have an impact on asset prices

II.3. Sequence and interdependence of rating changes

Existing empirical research suggests that the impact of ratings changes may be amplified if up- or downgrades occur in several steps one after the other. Moreover, since reputational effects are an important issue in the financial markets, rating agencies are likely to follow the ratings of their competitors, they are more likely to issue quasi simultaneous up- or downgrades.

Reisen and von Maltzan (1999) show that although rating events for individual agencies do not necessarily produce a significant response in yield spreads, rating announcements by two or more agencies can induce significant effects in the markets. In addition, results of two-way

Granger Causality tests indicate that, when controlling for factors common to bonds and ratings, in the long-term none of the three rating agencies appears to have greater impact on asset prices than the other agencies.

Kräussl (2005) investigates the impact of credit rating announcements on a generic speculative market pressure index encompassing change in nominal exchange rates, interest rate and stock market index. His findings indicate that downgrades and negative news signaling 'rating outlook' or 'rating watch' are significantly stronger than rating upgrades. He also shows that rating changes preceded by watch statement do not engender significant market reaction.

Analysing the interdependence in rating actions between CRAs, Alsakka and Gwilym (2010) observe that probability of an upgrade by one agency is higher in case of a recent upgrade of another agency, while downgrades are less probable if preceded by other downgrades.

Hypothesis 3: sequence of rating changes by different rating agencies may have different market effect

The Economist (2013) underline that no AAA- or AA-rated bond has ever defaulted within subsequent ten years and among A-rated bonds only holders of Greek debt had to accept a write-off. They predict that although investors are likely to continue using safe-haven ratings as a benchmark and further downgrades would not affect investors' demand, the impact on lower-rated bonds is still to be determined.

Santis (2012) analyses the role of credit ratings during the Eurozone crisis and shows that rating downgrades in Greece, Ireland and Portugal were associated with a rise in spreads in fiscally constrained countries, the spillover effects from Greece being the strongest.

Candelon, Sy, and Arezki (2011) apply VAR methods to estimate the impact of rating changes on international stock markets and sovereign CDS and find that the sign and magnitude of spillover effects depend on the type of announcements and the profile of the source country experiencing the downgrade. While actual rating downgrades in Peripheral Europe affect CDS spreads across Europe, the impact of outlook revision was mitigated. The impact of rating changes depends on the agency from which the announcements originates, rating changes by S&P are more likely to have more significant impact than the other agencies.

Claeys and Vasicek (2012) analyse the direction of bilateral linkages between government bond yields of EU countries using VAR methods. Their findings indicate that spillover effets vary across regions and are most important in the Eurozone, whereas Central European countries tend to affect each other. In turn, Denmark, Sweden and UK are rather insulated. Using this framework authors also find that while the impact of rating news on domestic sovereign spreads is limited, rating-induced spillover effects are heterogeneous and become stronger at the lower end of the rating scale. Their results show that downgrades in the Eurozone Periphery affected bonds in Netherlands, France, Belgium and the UK.

II.4. Dynamics of Capital Flows During Crisis Episodes

Empirical research shows that cross-country capital flows, including bond portfolio flows, are driven by changes in global risk sentiment.

Korinek (2011) demonstrates theoretically that when country becomes financially constrained global investors begin to look for other investment destinations. However, those hot money "flows" render recipient countries more vulnerable to adverse shocks which can lead to serial financial crisis simultaneously across countries.

Broner, Lorenzoni, and Schmukler (2013) investigate the term premium in emerging market foreign-currency sovereign bonds from the supply, i.e. new issuance, and demand angles. Comparing the twelve-and three-year maturities, they show that excess term premium rises considerably during crisis pushing governments to issue short-term bonds that remain relatively cheaper.

Looking at Eurozone government bonds between 2008 and 2010, Delatte, Gex, and López-Villavicencio (2012) find that market distress alters the price discovery process and transmission between CDS and bond market leading to the conclusion that in critical moments CDS tend to lead the bond market. In an earlier study Fontana and Scheicher (2010) show that bond markets tend to lead CDS markets in Euro Core countries and vice versa in Euro Peripheral countries.

F. Broner et al. (2013) present evidence for a heterogeneous set of over 100 countries that gross capital flows are pro-cyclical, with foreigners increasing their exposure in the country and domestic agents investing more abroad during expansions. During crisis, both in- and outflows come to a halt.

Hypothesis 4: global risk aversion affects the extent of impact of rating changes

III. Dataset and Methodology

III.1 The dataset

This new dataset has been created using data from national sources, mainly central banks, ministries of finance, statistical authorities and depositories, as presented in detail in the first article, and extended by Switzerland. Data includes historical series of holdings of government debt by key market players: non-resident private investors, non-resident official holdings, domestic banks, domestic pension and insurance funds and investment funds. In terms of broadness, it covers local currency government debt markets in three countries from Core Eurozone and five from Peripheral Eurozone, four so-called Safe Haven developed countries, and twelve emerging economies of different size and level of development. Data is available in monthly frequency for 16 countries and quarterly in the remaining 8 countries; quarterly data is repeated at last available value. Due to limited holdings data availability I focus on the period between 1996M1 and 2012M12.

III.2 Empirical Methodology

i. Model Specification: Impact of Rating Changes on Bondholdings and Yields

Studies on the impact of rating actions typically apply event studies on asset prices or exchange rates in daily frequency. However, in this case three factors speak in favour of taking on a different approach. First, holdings data is provided in monthly or quarterly frequency. Second, rating changes are often preceded by rating outlooks within two to three months before the rating change. Third, rating actions are often anticipated by the markets well in advance and an event study with a short window would not capture the anticipation effect. Fourth, institutional investors holding sovereign bonds are likely to modify their positions within a given time frame, in particular if they hold large positions of less liquid bonds or if the country loses or gains investment grade status. To take into account those factors I adapt framework of analysis applied by Broner et al. (2013) to analyse behaviour of capital flows around crisis episodes in a cross-country setting.

Formally, for each country *j* I examine the relationship between the change in bond holdings of investor *i* over the period of two months ahead and two months following the rating action which can be expressed as follows:

$$\text{Eq. 9} \quad \Delta \mathbf{y_{jt}}^{\mathbf{i}} = \alpha_{\mathbf{j}} + \sum_{z=-2}^{z=2} \boldsymbol{\beta_j Rating\ Action}_{j,t+z} + \sum_{c=1}^{c=5} \boldsymbol{\beta_j X_{jt}^{c}} + \mathbf{e_{jt}}$$

Where X stands for the following control variables, i.e. debt to GDP, primary budget balance, political risk and, last but not least, the rating outlook. The choice of control variables is based on previous research results on demand for government debt as well as relevant literature, see Santis (2012) among others.

The model is separately estimated in four different settings:

- general rating changes,

- rating up- or downgrade preceded (or not) by respectively positive or negative outlook,

- rating action preceded by earlier rating action that took place over 24 month horizon, i.e. serial up- or downgrade,

- multi-notch up- or downgrade, i.e. rating change by 1,2, or 3 and more notches within a single rating action

ii. Investor Types and Yields

For the aggregated debt figured in each country I use nominal amounts of bond holdings d^i held by specific investors, namely (i=1) for private non-resident investors, (i=2) for official non-resident investors, (i=3) for domestic banks, (i=4) for domestic pension and insurance funds, (i=5) for domestic investment and mutual funds. Sum of parts 1 to 5 together with other unidentified holdings represents total outstanding local currency debt of a given country. To account for heterogeneity resulting from differences in country size, indebtedness and use of local currency values I take log values of holdings.

$$\text{Eq. 10 } \boldsymbol{y^{i}} = \begin{matrix} \mathbf{Bondholding^{i}} \in [\mathbf{0}, \infty] \textbf{ for i} \in [\mathbf{1}, \mathbf{2}, \mathbf{3}, \mathbf{4}, \mathbf{5}] \\ \mathbf{5}\boldsymbol{Y\ Sovereign\ Yield\ for\ i} = \mathbf{6} \end{matrix}$$

As for the market-related variable I chose the local currency 5-year government bond yield for two reasons. First, 5-year bonds are liquid throughout the period of analysis both in advanced economies and in emerging markets with less developed financial markets. Second, market conventions suggest that, compared to other typical maturities like 2Y and 10Y, on average 5-year maturity represents a fair middle point between liquidity risk, credit risk and interest rate risk across countries.

iii. Pre-estimation Tests and Estimation Technique

Data stationarity has been verified both in level and first difference using Fisher-type unit root test for panel data, combined with Philips-Perron estimation method. Results in Table 27 indicate that series in level for non-official residents, banks, pensions and insurance funds, and government yields contain unit root in level, but not in first difference. Hence all the following tests are conducted in first difference.

To verify whether fixed or random effects are preferable in this setting I run a series of Hausman tests. Although test statistics in Table 28 indicate that random effects would be more suitable, none of the tests is consistently positive. In result I follow the approach undertaken by similar studies, e.g. Broner et al. (2013), and apply country fixed effects model. Presence of fixed time effects is verified using linear joint parameter tests. Results in Table 29 indicate that use of time effects would be advisable in case of both private and official non-residents as well as sovereign yields. To maintain consistency throughout the analysis I use fixed time effects in all further tests. Tests for heteroskedasticity are conducted using Modified Wald test for groupwise heteroskedasticity under individual fixed effects. Test statistics in Table 30 suggest that all data series are heteroskedastic. To verify whether autocorrelation of error terms is an issue in our dataset I use the methodology proposed by Woolridge (2002). Table 31 shows that serial correlation is an issue in all categories except pension and insurance funds. Finally, to verify whether data exhibits signs of cross-section dependence typical for macro panels with limited N and large T, I use the Pesaran Test for cross-section dependence. Test results in Table 32 indicate that the panels exhibit cross-section dependence.

Summing up, in the current setting data should be analyzed in first difference and under fixed country effects and time effects. What makes the choice of the estimation technique more complex, however, is that the dataset exhibits presence of serial autocorrelation, heteroskedasticity, cross-section dependence. The typical estimation method to deal with the last three issues would be the technique developed by Driscoll-Kraay (1998). However, this method is not compatible with the use of fixed time effects which are likely to be affect the magnitude of the impact of rating changes. Hence, following the discussion in De Hoyos and Sarafidis (2006) and the estimation approach by Broner et al. (2013) I use standard errors clustering method on country level and fixed time effects.

IV. Empirical Results

IV.1. Stylized Facts on Dynamics of the Investor Structure

Countries under analysis differ strongly in terms of the initial investor structure and dynamics in the last decade. Evidence presented in Table 1 shows that Eurozone countries have the highest share of non-resident holdings ranging from 36% for Spain up to 79% for Ireland, while large developed markets such as the Japan, UK and US rely to greater extent on domestic investors. Variation of holdings of non-resident investors is also highest in Eurozone countries and lowest in developed non-euro economies. Graphs 20 to 36 demonstrate the dynamics of the investor holdings in high-rating developed countries through the prism of credit default swaps and credit ratings. As benchmark for market-implied perception of credit riskiness I use CDS spreads. The key advantage over yields is that they do not depend on underlying benchmark bonds like in case of spreads and are available for all the countries irrespective of the currency of denomination.

While all safe-haven countries benefited from flight to safety effects during the 2008-2012 periods, paradoxically in Japan, US and France rating downgrades and spikes in CDS prices were associated with bond purchases by foreign investors.

Graphs 27 to 30 paint an entirely different picture for the Peripheral Eurozone. In fact, until late 2009 sovereign downgrades and that plagued those countries were associated with further increase in foreign participation that reached over 90% in Greece and 50% in Spain. The situation changed dramatically in 2010 when foreign investors revaluated the underlying risk of insolvency and withdrew brusquely from those markets.

As for emerging economies, the investor landscape is dominated by domestic banks and pensions and insurance funds, while non-resident investors hold between 1% and 25% of outstanding local currency debt instruments. Countries with larger GDP size and relatively open financial account such as Poland, Mexico, Indonesia and Turkey experience greater participation of foreign investors which is in line with the findings of Mehl and Reynaud (2010) among others. Graphs 9 to 19 demonstrate that from 2009 onwards share of non-resident holdings began to increase not only in emerging countries that succeeded in improving their sovereign rating, but also in Hungary, Mexico and Thailand that underwent rating downgrades in the recent years.

Another interesting pattern emerges with regard to pricing of sovereign bonds. To make the interpretation of graphs more intuitive across different countries and currencies instead of bond yield I plot sovereign CDS in USD as percentage of maximum country-specific level of CDS price. Graphs 9 to 19 reveal that spikes in perceived sovereign risk were

accompanied with a marked outflow of foreign bondholders only in a handful of cases around 2008/09: Malaysia, Peru, Hungary and Czech Republic. In turn, numerous episodes of sovereign instability around 2009 and 2011 were actually coupled with an inflow of foreign investors into EM bonds. Last but not least, holdings of domestic investors do not seem to be co-move significantly with sovereign risk or ratings.

IV.2. Stylized Facts on Sovereign Rating Actions

It is common knowledge that both the business model and de facto behaviour of rating agencies are strongly based on reputation effects. In absence of a gain potential for providing a positive rating, analysts have greater incentive to be pessimistic about the asset under review in order to limit their reputation loss in case of deterioration of the actual credit quality. Table 2 demonstrates that the distribution of rating actions is clearly skewed. In total, rating agencies have announced 207 downgrades compared to 166 upgrades. In terms of reactivity, with 86 downgrades S&P has undertaken more downgrades than its peers.

Decomposition of rating actions by country group and sub-periods reveals an interesting pattern. First, between 1996 and 2007 most rating downgrades concerned emerging economies while less than 10% of downgrades referred to advanced economies. At the same time, years of economic stabilization in EMs and boom years in the Eurozone resulted in over 100 notches in upgrades. The global financial crisis turned the situation upside down, EMs have been downgraded by 29 notches, Peripheral Eurozone by 73 notches and non-euro advanced economies by 7 notches. Relatively few countries have been upgraded during this period.

Graphical analysis

In the aftermath of large-scale sovereign defaults in Latin America, Asia and Eastern Europe at the end of XXth century, Ferri, Liu, and Stiglitz (1999) argued that rating agencies tend to publish benign reviews during expansion phases and become excessively pessimistic during recessions. Such a sequence of downgrades that destabilize financial markets would lead to capital outflows that further exacerbate the downturn. Data in this sample confirms this rating analyst's behavior, as rating agencies undertake both multi-notch downgrades and sequences of downgrades.

Results in the bottom part of Table 2 suggest that on average one downgrade action resulted in a downward revision by 1.4 to 1.7 notches, whereas upgrades oscillate around 1.1 to 1.2 notches on the upside.

To provide a more detailed picture on sequential up- and downgrades, I calculate the number of notches changed upon one downgrade as well as cumulative number of notches downgraded on 2-year rolling basis. Tables 3 and 4 show that Peripheral Eurozone countries have been among the most punished in our sample, most countries have been downgraded by 2 to 4 notches in one action by at least one rating agency. Moreover, Greece, Portugal, Ireland and Spain have been downgraded between 7 and 14 notches within a two year horizon by at least one rating agency. These results go way beyond the downgrades in Indonesia, Malaysia and Thailand that took place during the Asian crisis in 1998.

Compared to the downgrades around crisis episodes, the history of serial and multiple-notch upgrades appears far less startling. Most EM countries have been upgraded by a maximum 1 to 2 notches in one action, while sequence of upgrades over 24 months happened less than 20% of the time.

IV.3. Impact of Rating Actions: Entire Sample

I begin the econometric analysis by investigating the impact of basic rating up- and downgrades on bond holdings and yields for the entire sample and different sub-groups.

Due to large heterogeneity in country characteristics, results for the entire sample indicate that basic rating actions do not cause significant changes in the behaviour of investors. Regression results in Tables 5 point towards a weak and ambiguous reaction of foreign private investors to rating upgrades. Table 6 demonstrates that downgrades are significantly related to changes in holdings of domestic pension and insurance companies and investment funds. Interestingly, sovereign bond yields react strongly not only to rating changes two months ahead of the downgrade, i.e. typically when the outlook or watch are issued, but also in the month of the downgrade itself.

In the following step I examine whether the anticipation effect has a role to play and I conduct the tests under distinction for rating changes that are preceded or not by an outlook change. Results in Tables 7 and 8 show that foreign official holders and investment funds exhibit a stronger reaction to unanticipated downgrades and upgrades. In turn, bond yields increase significantly in case of downgrades preceded by negative outlooks, while unpreceded

downgrades induce some bond volatility 2 months before and after the rating change, the letter result being difficult to interpret.

So far regression results for the full sample remain inconclusive, hence we follow the approach of Pukthuanthong-Le, Elayan, and Rose (2007) who argue that tests on smaller and less heterogeneous country groups may provide better insights into market dynamics.

IV.4. Impact of Rating Actions in Safe Haven Countries

I begin the analysis with the impact of sovereign downgrades on holdings and yields of Safe Haven countries, i.e. France, US and Japan. Table 9 indicates that downgrades were followed by a slight reaction among foreign investors and yield compression around two months following the downgrade, though these results should be taken with a pinch of salt.

IV.5. Impact of Rating Actions in Peripheral Eurozone

While sovereign downgrades occurred all along the Eurozone crisis, upgrade episodes took place both in the boom years preceding the crisis and again in 2012 when the situation when the dust settled. Tables 10 and 11 indicate that upgrades by Moody's were associated with increases in bond purchases by private non-residents, while holdings of domestic investment funds increased significantly in reaction to upgrades by S&P and Fitch. Sovereign yields reacted positively to upgrades two months ahead of time which is again difficult to attribute to rating changes.

Table 12 presents the results for the reaction of bondholdings to serial upgrades that occured over 24 month horizon. While the first upgrade passes relatively unperceived, the second and third upgrades clearly provoke a significant and strong reaction before and after the rating action among foreign private investors, banks and investment funds. Interestingly, sovereign yields do not react to any of serial upgrades.

Results in Table 14 demonstrate that rating downgrades, in particular these undertaken by S&P and Moody's, are associated with outflows of foreign private investors two months before the event and in the month following the rating event. While holdings of domestic investors are relatively unaffected. Sovereign bond yields widen considerably two months before and in the month when the downgrade took place, which is consistent with the broad literature in this fields.

Results for serial downgrades in Table 16 show that the third and further downgrades engender an extremely strong spread widening two months ahead of the downgrade. The strongest reaction in holdings of foreign private and official investors and domestic banks within two months of the rating action.

Tests for multi-notch downgrades included in Table 17 indicate that 1- and 3-notch downgrades induce foreign private investors to sell government bonds.

IV.6. Impact of Rating Actions in Emerging Economies

Results in Table 18 show that while rating upgrades of Emerging Market countries do not affect significantly investor holdings, sovereign yields fall prior and following upgrades by S&P. However, analysis of serial rating upgrades presented in Table 19 provides valuable insights into investor behavior. Foreign private investors and domestic pension and insurance funds increase considerably their participation following the third rating upgrade, whereas banks tend to sell their holdings. Interestingly, while one upgrade does not induce marked reactions, the impact on the second or third upgrade on sovereign yields is strong and highly significant. Finally, results for multi-notch upgrades located in Table 20 suggest that foreign private investors and domestic pension funds change their holdings significantly in reaction to two-notch upgrades, while sovereign yields compress ahead of 1- and 3-notch upgrades.

Results for downgrades by rating agency for EM countries presented in Table 21 indicate that foreign private investors and domestic pension funds diminish significantly their holdings following downgrades by Fitch, while sovereign yields increase considerably ahead of those downgrades. In terms of serial rating changes, third and further downgrades induce significant outflows by non-resident and bank investors. Sovereign yields increase significantly during the two months preceding the third downgrade, but tend to stabilize afterwards. Finally, the number of notches changes upon one action appears to play a role. Similarly as in case of Eurozone Periphery, one-notch downgrades induce limited reaction in EM countries. However, non-residents, banks and pension and funds change significantly their positions and tend to sell bonds in case of 2- and 3-notch downgrades, while yields increase most following 2-notch downgrades.

V. Conclusions

To date, empirical research focused mainly on the reaction of asset prices to changes in credit ratings, while the impact on holdings of underlying assets remained relatively

unexplored. This paper fills this gap using a new proprietary dataset on sovereign bondholdings and aims to shed new light on the changes in investor structure and bond yields. Econometric analysis is conducted on a broad and heterogeneous panel of countries under consideration for different country types and rating agencies, anticipative effects related to rating outlooks, and general vs. serial rating changes vs. multi-notch rating changes. The main results are as follows.

Findings for the full sample indicate that upgrades exert no consistent and significant impact neither on investor holdings nor on bond yields, no matter whether they are preceded by an outlook warning or not. However, in case of Peripheral Eurozone and Emerging Economies rating upgrades pushed domestic asset managers and pension funds to change their allocation to domestic government bonds.

In contrast, results for the full sample of countries indicate that sovereign yields and all types of domestic investors are affected by rating downgrades, in particular those preceded by negative outlooks. In case of Eurozone Periphery and Emerging Economies, foreign private investors and sovereign yields were influenced in particular by the second and third downgrades over two-year horizon.

Downgrades by S&P and Moody's in Peripheral Eurozone were associated not only with significant changes in holdings among non-resident private investors and non-resident central banks, but also with intensification of yield volatility. In Emerging Economies, downgrades by Fitch affected the holdings of foreign investors, domestic banks and pension funds, and sovereign bonds. Last but not least, investors in Emerging Economies reacted differently to 1st and 3rd downgrades over a two year horizon and to multi-notch downgrades.

Presented results convey meaningful policy and investment implications. First, rating changes not only affect the bond yields, but more importantly they change the structure of investor holdings. Even though at this stage of research the holdings-yields relationship has not been entirely identified, it is conceivable that a permanent change in demand for government bonds may change the level and volatility of bond yields and, in consequence, overall debt sustainability in the long run. Finally, this analysis could be extended into a broader theoretical and empirical framework for examining inter-dependence between macroeconomic capital flows, i.e. equity and bond flows, and credit ratings.

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Table 1

Table 1 Data Availability and Descriptive Statistics

Country	Data Frequency	Series for Bills and Bonds	Non-residents		Domestic Banks		Domestic Insurance and Pension Funds		Domestic Investment Funds	
			Mean	St Dev	Mean	St Dev	Mean	St Dev	Mean	St Dev
Brazil	Monthly	N	9%	3%	37%	5%	20%	1%	30%	3%
Czech Republic	Monthly	Y	8%	4%	52%	12%	20%	6%	4%	2%
Denmark	Monthly	Y	30%	4%	19%	6%	26%	11%	0%	0%
France	Monthly	N	48%	13%	14%	4%	30%	8%	8%	4%
Germany	Quarterly	Y	79%	11%	6%	4%	2%	1%	10%	5%
Greece	Quarterly	Y	60%	14%	22%	10%	0%	0%	0%	0%
Hungary	Quarterly	Y	23%	9%	27%	4%	21%	6%	7%	2%
India	Quarterly	N	1%	0%	42%	3%	21%	6%	12%	5%
Indonesia	Monthly	N	18%	12%	71%	24%	19%	1%	7%	1%
Ireland	Monthly	N	76%	19%	14%	6%	4%	3%	2%	2%
Israel	Monthly	Y	6%	4%	20%	3%	48%	3%	19%	3%
Italy	Monthly	Y	60%	11%	18%	5%	0%	0%	14%	7%
Japan	Quarterly	Y	6%	2%	39%	6%	22%	2%	5%	1%
Malaysia	Quarterly	Y	10%	13%	18%	4%	63%	11%	0%	0%
Mexico	Monthly	Y	17%	11%	20%	6%	52%	15%	12%	11%
Netherlands	Quarterly	Y	74%	6%	9%	1%	13%	4%	1%	1%
Peru	Monthly	N	25%	13%	16%	8%	52%	6%	3%	3%
Poland	Monthly	Y	21%	6%	29%	6%	37%	3%	8%	2%
Portugal	Quarterly	N	62%	14%						
Spain	Monthly	Y	36%	12%	7%	6%	11%	2%	20%	13%
Thailand	Monthly	Y	6%	5%	30%	7%	39%	6%	0%	0%
Turkey	Monthly	N	13%	4%	55%	5%	0%	0%	4%	1%
UK	Quarterly	Y	24%	7%	6%	4%	48%	12%	10%	4%
US	Quarterly	N	27%	6%	2%	1%	5%	1%	5%	1%

Note: Averages and Standard Deviations based on Quarterly Data

Table 2

Table 2 Number and Magnitude of Rating Actions

	Downgrades			Upgrades		
	Fitch	**S&P**	**Moody's**	**Fitch**	**S&P**	**Moody's**
Number of Rating Actions						
Full Sample 1996-2012	68	86	53	53	51	62
Sub-sample 1996-2007	34	47	17	38	36	45
Emerging Economies	24	36	16	32	31	32
Euro Periphery	3	4	0	6	5	10
Safe Havens	0	0	0	0	0	2
Sub-sample 2007-2012	34	39	36	14	17	17
Emerging Economies	10	11	8	13	12	16
Euro Periphery	23	25	25	1	1	0
Safe Havens	1	3	3	0	1	0
Average Number of Notches During One Rating Action						
Full Sample 1996-2012	1.5	1.4	1.7	1.1	1.2	1.2
Sub-sample 1996-2007	1.2	1.3	1.4	1.0	1.2	1.2
Sub-sample 2007-2012	1.6	1.4	1.8	1.3	1.2	1.0

Note:

Table 3

Table 3 Magnitude Rating Changes upon of Downgrades

	Maximum number of notches			Maximum number of notches		
Country	**Fitch**	**S&P**	**Moody's**	**Fitch**	**S&P**	**Moody's**
France	0	1	1	0	1	1
Germany	0	0	0	0	0	0
Netherlands	0	0	0	0	0	0
Greece	4	3	4	14	13	15
Ireland	3	2	5	7	6	9
Italy	2	2	3	3	3	6
Portugal	3	3	4	8	7	10
Spain	3	2	3	7	5	9
Denmark	0	0	0	0	0	0
Japan	2	1	2	2	3	2
Switzerland	0	0	0	0	0	0
UK	0	0	0	0	0	0
US	0	1	0	0	1	0
Brazil	1	1	1	2	1	1
Bulgaria	1	1	0	1	1	0
Colombia	1	1	2	2	2	2
Czech Republic	1	1	0	1	1	0
Hungary	1	1	2	2	2	3
Iceland	0	0	0	0	0	0
India	1	1	0	1	1	0
Indonesia	3	4	4	6	8	6
Israel	0	0	0	0	0	0
Latvia	0	0	0	0	0	0
Malaysia	2	2	3	2	5	5
Mexico	1	1	0	1	1	0
Peru	1	1	0	1	1	0
Poland	0	0	0	0	0	0
South Africa	0	0	0	0	0	0
Thailand	1	1	1	1	4	5
Turkey	1	1	0	3	2	1
Cross-country						

Note:

Table 4

Table 4 Magnitude Rating Changes upon of Upgrades

	Maximum number of notches			Maximum number of notches		
Country	**Fitch**	**S&P**	**Moody's**	**Fitch**	**S&P**	**Moody's**
France	0	0	0	0	0	0
Germany	0	0	0	0	0	0
Netherlands	0	0	0	0	0	0
Greece	4	3	2	4	3	2
Ireland	1	1	2	0	1	0
Italy	1	0	1	1	0	1
Portugal	1	1	2	0	0	0
Spain	1	1	2	1	1	2
Denmark	1	1	1	1	1	1
Japan	0	1	1	0	1	1
Switzerland	0	0	0	0	0	0
UK	0	0	0	0	0	0
US	0	0	0	1	1	1
Brazil	3	2	3	1	1	1
Bulgaria	3	3	3	1	1	2
Colombia	1	1	1	1	1	1
Czech Republic	1	2	3	1	2	3
Hungary	2	2	2	2	1	2
Iceland	0	0	0	0	0	0
India	1	2	2	1	1	1
Indonesia	2	9	2	1	5	1
Israel	1	1	1	1	1	1
Latvia	0	0	0	0	0	0
Malaysia	3	2	2	1	1	1
Mexico	2	2	2	1	1	1
Peru	2	2	2	2	2	2
Poland	1	2	2	1	1	2
South Africa	0	0	0	0	0	0
Thailand	2	2	2	1	1	2
Turkey	3	3	1	2	1	1
Cross-country Maximum	**4**	**9**	**3**	**4**	**5**	**3**

Note:

Table 5

Impact of Sovereign Rating Upgrades on Investor Holdings and Yields in All Countries

	(1) Foreign	(2) Foreign	(3) Banks	(4) Pension	(5) Inv.	(6) Sov. Yield
Upgrade T-2	-0.02*	0.01	-0.00	-0.01	-0.03	-0.06
	(-1.82)	(0.72)	(-0.06)	(-0.47)	(-1.47)	(-0.73)
Upgrade T-1	0.00	0.00	-0.02	-0.00	0.00	0.02
	(0.11)	(0.19)	(-0.69)	(-0.02)	(0.17)	(0.40)
Upgrade T	0.00	-0.02	0.00	0.02	-0.01	0.01
	(0.02)	(-0.76)	(0.46)	(1.45)	(-0.24)	(0.11)
Upgrade T+1	0.03	0.01	0.01	0.00	-0.04	0.14
	(1.24)	(1.66)	(0.89)	(0.33)	(-1.32)	(0.87)
Upgrade T+2	0.00	0.02	-0.01	0.02	0.02	-0.03
	(0.06)	(0.78)	(-0.62)	(1.31)	(1.07)	(-0.58)
Debt to GDP	0.01	-0.30*	-0.01	-0.04	0.05	0.28
	(0.50)	(-1.82)	(-0.55)	(-1.32)	(1.15)	(0.95)
Budget Balance	-0.00	-0.27	-0.18***	-0.18***	0.05	0.10
	(-0.05)	(-0.98)	(-3.50)	(-2.96)	(0.58)	(0.08)
Political Risk	-0.00**	-0.00	0.00	-0.00	0.00	0.01
	(-2.19)	(-0.08)	(0.36)	(-0.08)	(0.76)	(1.53)
Risk Aversion Index	-0.02	-0.08***	-0.01	-0.01	-0.00	-0.23***
	(-1.14)	(-7.72)	(-0.19)	(-1.02)	(-0.01)	(-3.03)
Positive Outlook	0.01	0.02	-0.00	0.01	-0.00	-0.06
	(0.49)	(0.57)	(-0.01)	(0.80)	(-0.23)	(-1.09)
R-squared	0.11	0.27	0.08	0.09	0.09	0.15
Nb of Observations	2340	1203	2358	1828	1672	2716
Nb of Countries	22	13	22	19	18	24
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes

t statistics in parentheses Note: Standard errors clustered on country basis. * p<.10, ** p<.05, *** p<.01

Table 6

Impact of Sovereign Rating Downgrades on Bond Holdings and Yields in All Countries

	(1) Foreign	(2) Foreign	(3) Banks	(4) Pension	(5) Inv.	(6) Sov. Yield
Downgrade T-2	-0.01	0.02	0.04	0.03	0.01	0.18*
	(-1.24)	(1.73)	(1.60)	(1.41)	(0.43)	(2.02)
Downgrade T-1	0.01	-0.02	0.02	0.02**	0.00	0.08
	(1.08)	(-1.34)	(1.54)	(2.80)	(0.26)	(1.29)
Downgrade T	-0.02	-0.01	-0.01	-0.02**	-0.01	0.20**
	(-1.41)	(-0.85)	(-0.50)	(-2.47)	(-1.25)	(2.40)
Downgrade T+1	-0.01	-0.00	-0.01	0.01	0.01	-0.01
	(-0.54)	(-0.20)	(-1.48)	(1.35)	(0.77)	(-0.13)
Downgrade T+2	-0.00	-0.04	0.00	0.00	-0.02	-0.06
	(-0.33)	(-1.64)	(0.07)	(0.05)	(-1.06)	(-0.81)
Debt to GDP	0.02	-0.30*	-0.02	-0.05	0.05	0.16
	(0.70)	(-1.88)	(-0.93)	(-1.30)	(1.07)	(0.61)
Budget Balance	-0.02	-0.35	-0.18***	-0.14**	0.02	0.30
	(-0.23)	(-1.11)	(-4.46)	(-2.55)	(0.24)	(0.25)
GDP Growth Trend	0.04	-0.01	-0.08	0.09	-0.09	-0.71
	(0.42)	(-0.10)	(-1.71)	(1.06)	(-1.54)	(-0.62)
Political Risk	-0.00*	-0.00	0.00	-0.00	0.00	0.01
	(-1.74)	(-0.03)	(0.19)	(-0.12)	(0.83)	(1.50)
Risk Aversion Index	-0.02	-0.08***	-0.03	-0.03**	-0.03*	0.08
	(-1.32)	(-7.19)	(-0.89)	(-2.17)	(-2.07)	(1.22)
Negative Outlook	-0.01	0.01	0.01	0.04	-0.03*	0.10
	(-1.47)	(0.39)	(0.40)	(1.08)	(-1.95)	(0.65)
R-squared	0.11	0.28	0.09	0.10	0.08	0.16
Nb of Observations	2340	1203	2358	1828	1672	2716
Nb of Countries	22	13	22	19	18	24
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes

t statistics in parentheses. Note: Standard errors clustered on country basis. * p<.10, ** p<.05, *** p<.01

Table 7

Impact of Sovereign Rating Upgrades on Investor Holdings and Yields: Preceded vs. Unpreceded by Outlook

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Foreign Private		Foreign Official		Banks		Pension & Ins		Inv. Fund		Sov. Yield	
	Prec.	Unprec.	Prec.	Unprec.	Prec.	Unprec.	Prec.	Unprec.	Prec.	Unprec.	Prec.	Unprec.
Upgrade T-2	-0.01	-0.04	-0.01	0.03*	0.05	-0.14	0.01	-0.01	-0.05*	-0.06*	-0.06	0.51
	(-0.15)	(-1.08)	(-1.57)	(1.99)	(1.13)	(-1.38)	(0.51)	(-0.50)	(-1.83)	(-1.99)	(-0.53)	(1.13)
Upgrade T-1	-0.00	-0.01	-0.00	0.03*	-0.06	0.08	0.01**	0.00	0.01	0.05**	0.11	-0.08
	(-0.05)	(-0.16)	(-0.06)	(1.93)	(-1.18)	(1.54)	(2.86)	(0.10)	(0.53)	(2.19)	(1.06)	(-0.64)
Upgrade T	-0.00	0.06	-0.02	-0.21***	0.01	-0.03	0.01	0.00	-0.03	-0.01	0.16	-0.04
	(-0.14)	(1.51)	(-0.94)	(-6.70)	(0.32)	(-1.11)	(1.50)	(0.45)	(-1.21)	(-0.61)	(0.76)	(-0.17)
Upgrade T+1	0.04*	0.01	-0.01	0.03*	0.01	0.02	0.00	0.00	-0.09	-0.08**	-0.03	1.22
	(1.79)	(0.30)	(-0.97)	(1.97)	(0.80)	(0.77)	(0.13)	(0.19)	(-1.03)	(-2.63)	(-0.34)	(1.23)
Upgrade T+2	0.03	-0.01	0.02	0.03*	-0.00	-0.04	0.05	-0.02	0.04	-0.00	-0.04	-0.19
	(0.86)	(-0.36)	(0.67)	(1.97)	(-0.01)	(-1.41)	(1.01)	(-1.12)	(0.91)	(-0.01)	(-0.68)	(-0.95)
Debt to GDP	0.01	0.01	-0.30*	-0.30*	-0.01	-0.01	-0.04	-0.04	0.05	0.05	0.27	0.26
	(0.47)	(0.52)	(-1.82)	(-1.81)	(-0.55)	(-0.49)	(-1.39)	(-1.32)	(1.13)	(1.12)	(0.93)	(0.86)
Budget Balance	-0.00	-0.00	-0.27	-0.27	-0.18***	-0.17***	-0.18***	-0.18**	0.04	0.04	0.11	0.01
	(-0.06)	(-0.04)	(-0.96)	(-0.96)	(-3.71)	(-3.53)	(-2.93)	(-2.76)	(0.51)	(0.47)	(0.08)	(0.01)
Political Risk	-0.00**	-0.00**	-0.00	-0.00	0.00	0.00	-0.00	-0.00	0.00	0.00	0.01	0.01
	(-2.21)	(-2.13)	(-0.07)	(-0.06)	(0.33)	(0.53)	(-0.05)	(-0.11)	(0.82)	(0.82)	(1.55)	(1.43)
Risk Aversion Index	-0.02	-0.02	-0.08***	-0.08***	-0.01	-0.01	-0.01	-0.01	0.01	0.01	-0.23***	-0.24***
	(-1.14)	(-1.15)	(-7.73)	(-7.75)	(-0.19)	(-0.19)	(-1.02)	(-1.04)	(0.51)	(0.52)	(-3.04)	(-3.07)
Positive Outlook	0.01	0.01	0.01	0.01	0.00	-0.00	0.01	0.01	-0.01	-0.00	-0.06	-0.04
	(0.62)	(0.49)	(0.52)	(0.47)	(0.01)	(-0.09)	(0.81)	(0.79)	(-0.58)	(-0.41)	(-1.18)	(-1.00)
R-squared	0.11	0.11	0.27	0.28	0.08	0.09	0.09	0.09	0.09	0.08	0.15	0.17
Nb of Observations	2340	2340	1203	1203	2358	2358	1828	1828	1672	1672	2716	2716
Nb of Countries	22	22	13	13	22	22	19	19	18	18	24	24
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

t statistics in parentheses. Note: Standard errors clustered on country basis. * p<.10, ** p<.05, *** p<.01

Table 8

Impact of Sovereign Rating Downgrades on Investor Holdings and Yields: Preceded vs. Unpreceded by Outlook

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Foreign Private		Foreign Official		Banks		Pension & Ins		Inv. Fund		Sov. Yield	
	Prec.	Unprec.	Prec.	Unprec.	Prec.	Unprec.	Prec.	Unprec.	Prec.	Unprec.	Prec.	Unprec.
Downgrade T-2	-0.02	0.01	0.03	0.00	0.02	0.10	0.05	-0.00	-0.02	0.05	0.27	-0.21**
	(-1.36)	(0.67)	(1.76)	(0.08)	(0.82)	(0.94)	(1.34)	(-0.17)	(-1.41)	(1.21)	(1.70)	(-2.19)
Downgrade T-1	-0.01	0.04	-0.01	0.01	0.04***	-0.01	0.02	0.02	-0.01	0.01	0.06	0.18
	(-0.59)	(1.46)	(-0.92)	(0.47)	(3.82)	(-0.39)	(1.44)	(1.28)	(-0.31)	(0.53)	(0.56)	(1.21)
Downgrade T	-0.00	-0.08	0.01	-0.05**	0.01	0.02	-0.02*	-0.03	-0.00	-0.00	0.26**	0.15
	(-0.06)	(-1.19)	(0.70)	(-2.68)	(0.69)	(0.33)	(-1.76)	(-1.37)	(-0.38)	(-0.04)	(2.59)	(0.94)
Downgrade T+1	-0.02	0.03	0.02	-0.00	-0.04*	0.01	-0.01	0.01	-0.02	0.08*	0.14	-0.03
	(-1.30)	(1.58)	(1.54)	(-0.08)	(-1.86)	(0.27)	(-0.66)	(0.82)	(-0.58)	(1.99)	(1.22)	(-0.32)
Downgrade T+2	-0.02	0.01	-0.07	-0.02	0.01	0.01	0.01	0.01	-0.01	-0.03**	0.04	-0.18**
	(-1.33)	(0.17)	(-1.59)	(-0.39)	(0.30)	(0.13)	(1.33)	(0.30)	(-0.26)	(-2.20)	(0.51)	(-2.33)
Debt to GDP	0.02	0.01	-0.30*	-0.30*	-0.01	-0.01	-0.05	-0.04	0.06	0.06	0.22	0.27
	(0.69)	(0.56)	(-1.86)	(-1.83)	(-0.65)	(-0.49)	(-1.34)	(-1.31)	(1.21)	(1.20)	(0.79)	(0.89)
Budget Balance	-0.02	0.00	-0.29	-0.29	-0.18***	-0.16***	-0.15***	-0.17**	0.01	0.04	0.34	0.13
	(-0.25)	(0.00)	(-0.98)	(-1.04)	(-3.91)	(-4.03)	(-3.37)	(-2.37)	(0.16)	(0.53)	(0.26)	(0.10)
Political Risk	-0.00*	-0.00**	-0.00	-0.00	0.00	0.00	-0.00	-0.00	0.00	0.00	0.01	0.01
	(-1.97)	(-2.17)	(-0.02)	(-0.10)	(0.31)	(0.34)	(-0.12)	(-0.11)	(0.88)	(0.83)	(1.47)	(1.54)
Risk Aversion Index	-0.02	-0.02	-0.08***	-0.08***	-0.03	-0.02	-0.03*	-0.01	0.01	0.01	0.07	0.08
	(-1.32)	(-1.42)	(-7.68)	(-8.46)	(-0.91)	(-0.85)	(-2.01)	(-1.12)	(0.61)	(0.58)	(1.33)	(1.44)
R-squared	0.11	0.11	0.28	0.27	0.08	0.08	0.10	0.09	0.08	0.08	0.16	0.15
Nb of Observations	2340	2340	1203	1203	2358	2358	1828	1828	1672	1672	2716	2716
Nb of Countries	22	22	13	13	22	22	19	19	18	18	24	24
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors clustered on country basis. *t* statistics in parentheses. * p<.10, ** p<.05, *** p<.01

Table 9

Impact of Sovereign Rating Downgrades on Bond Holdings and Yields in Safe Haven Countries

	(1) Foreign Private	(2) Foreign Official	(3) Banks	(4) Pension & Ins	(5) Inv. Fund	(6) Sov. Yield
Downgrade T-2	-0.01	0.01	-0.02	0.00	0.10	0.07
	(-0.51)	(0.58)	(-0.32)	(1.01)	(1.32)	(0.95)
Downgrade T-1	-0.02	-0.01	-0.01	0.02	-0.08	0.00
	(-0.93)	(-0.92)	(-0.34)	(1.04)	(-1.59)	(0.10)
Downgrade T	0.01	-0.00	0.01	0.00	0.00**	0.02
	(0.93)	(-1.13)	(1.18)	(1.16)	(3.13)	(0.38)
Downgrade T+1	0.07	-0.04**	0.03	0.00	0.03	0.00
	(2.05)	(-3.90)	(1.03)	(0.01)	(0.75)	(0.05)
Downgrade T+2	0.04*	-0.01	0.01	0.01	-0.02	-0.05***
	(2.35)	(-0.57)	(0.51)	(1.24)	(-0.30)	(-4.13)
Debt to GDP	-0.07	0.02	-0.23	-0.03	-0.03	0.19
	(-1.51)	(0.72)	(-2.01)	(-0.88)	(-0.76)	(1.46)
Budget Balance	-0.40	-0.12	-1.23	-0.02	0.36	-0.21
	(-1.54)	(-1.12)	(-1.69)	(-0.20)	(1.04)	(-0.37)
GDP Growth Trend	-0.39	0.20	-2.99	-1.11***	-0.76	-0.18
	(-0.60)	(0.46)	(-1.53)	(-7.29)	(-1.30)	(-0.24)
Political Risk	0.00	-0.00***	-0.00	-0.00	-0.00	0.00
	(1.50)	(-5.83)	(-0.95)	(-1.99)	(-1.44)	(0.34)
Risk Aversion Index	-0.00	0.00	-0.01	-0.01	-0.01	-0.04***
	(-0.37)	(1.49)	(-0.91)	(-1.75)	(-0.92)	(-4.28)
Negative Outlook	-0.04	0.00	0.00	0.02**	-0.06*	-0.06
	(-1.25)	(0.36)	(0.17)	(2.95)	(-2.69)	(-1.71)
R-squared	0.24	0.54	0.19	0.25	0.27	0.77
Nb of Observations	398	398	398	398	398	474
Nb of Countries	5	5	5	5	5	6
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors clustered on country basis. *t* statistics in parentheses. * p<.10, ** p<.05, *** p<.01

Table 10

Impact of Sovereign Rating Upgrades on Investor Holdings and Yields in Peripheral Eurozone

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Foreign Private				Foreign Official				Banks			
	Cross	S&P	Fitch	Mdy's	Cross	S&P	Fitch	Mdy's	Cross	S&P	Fitch	Mdy's
Upgrade T-2	-0.01	0.01	-0.03***	-0.01	0.01	0.00	0.02	-0.00	0.05	-0.21	0.14	-0.01
	(-0.52)	(0.65)	(-5.91)	(-1.59)	(0.61)	(0.25)	(0.83)	(-0.47)	(0.36)	(-1.58)	(1.53)	(-0.03)
Upgrade T-1	0.00	-0.01	0.01	0.02**	-0.00	0.00	-0.01	-0.00	-0.10	0.06	-0.09	-0.27
	(0.37)	(-0.53)	(0.33)	(3.34)	(-0.84)	(0.08)	(-0.56)	(-0.47)	(-0.97)	(0.78)	(-1.50)	(-1.28)
Upgrade T	0.00	-0.02	0.00	0.04**	-0.00	0.01	-0.00	-0.02	-0.00	-0.04	-0.03	0.03
	(0.14)	(-0.91)	(0.35)	(3.78)	(-0.09)	(0.54)	(-0.97)	(-0.54)	(-0.04)	(-0.52)	(-0.49)	(0.82)
Upgrade T+1	-0.01	-0.05	0.01	-0.05	0.01	-0.00	0.02	-0.00	0.03	0.09	-0.00	-0.02
	(-0.51)	(-1.40)	(1.21)	(-1.24)	(0.70)	(-0.13)	(0.97)	(-0.16)	(0.79)	(1.02)	(-0.01)	(-0.38)
Upgrade T+2	0.01	0.03	-0.00	0.01	-0.00	0.00	-0.00	-0.00	-0.09	-0.04	-0.14	-0.11
	(0.58)	(1.06)	(-0.19)	(0.20)	(-0.31)	(0.44)	(-0.02)	(-0.67)	(-1.21)	(-0.59)	(-0.77)	(-1.27)
Debt to GDP	-0.07	-0.07	-0.07	-0.07	0.02	0.02	0.02	0.02	-0.03	-0.02	-0.02	-0.04
	(-1.35)	(-1.39)	(-1.35)	(-1.34)	(0.18)	(0.19)	(0.18)	(0.18)	(-0.29)	(-0.26)	(-0.17)	(-0.42)
Budget Balance	-0.12	-0.11	-0.12	-0.12	0.18	0.18	0.18	0.19	-0.23	-0.24	-0.24	-0.20
	(-2.13)	(-2.08)	(-2.15)	(-2.16)	(0.91)	(0.90)	(0.91)	(0.94)	(-1.55)	(-1.50)	(-1.45)	(-1.47)
Political Risk	-0.00	-0.00	-0.00	-0.00	0.00	-0.00	0.00	0.00	-0.00	-0.00	-0.00	-0.00
	(-1.32)	(-1.11)	(-1.34)	(-1.37)	(0.01)	(-0.00)	(0.03)	(0.01)	(-0.84)	(-0.93)	(-1.09)	(-0.46)
Risk Aversion Index	-0.01	-0.01*	-0.01	-0.01	-0.06***	-0.06***	-0.06***	-0.06***	0.01	0.01	0.01	0.01
	(-2.30)	(-2.45)	(-2.33)	(-2.19)	(-13.65)	(-13.60)	(-13.60)	(-13.59)	(1.09)	(1.11)	(1.21)	(0.86)
Positive Outlook	-0.00	0.00	-0.00	-0.01	0.02	0.02	0.02	0.02	0.01	-0.02	0.01	-0.02
	(-0.20)	(0.01)	(-0.16)	(-0.66)	(1.14)	(1.00)	(0.95)	(0.95)	(0.14)	(-0.36)	(0.09)	(-0.38)
R-squared	0.41	0.42	0.41	0.42	0.61	0.61	0.61	0.61	0.35	0.35	0.35	0.35
Nb of Observations	544	544	544	544	524	524	524	524	544	544	544	544
Nb of Countries	4	4	4	4	4	4	4	4	4	4	4	4
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors clustered on country basis. *t* statistics in parentheses. * p<.10, ** p<.05, *** p<.01

Table 11

Impact of Sovereign Rating Upgrades on Investor Holdings and Yields in Peripheral Eurozone - continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Inv. Fund				Sov. Yield		
	Cross	S&P	Fitch	Mdy's	Cross	S&P	Fitch	Mdy's
Upgrade T-2	-0.00	0.01	-0.02**	0.01	0.36	0.78*	-0.08	1.07**
	(-0.46)	(2.27)	(-6.36)	(0.35)	(1.93)	(2.22)	(-1.16)	(3.85)
Upgrade T-1	0.00	-0.01	-0.00	0.03	-0.18	-0.28	-0.13	-0.23
	(0.11)	(-1.79)	(-0.53)	(1.23)	(-1.47)	(-1.48)	(-1.18)	(-0.79)
Upgrade T	-0.00	0.02*	-0.01**	-0.00	-0.27	-0.47	-0.15	-0.55
	(-0.46)	(4.22)	(-4.72)	(-0.05)	(-1.28)	(-1.72)	(-1.45)	(-1.56)
Upgrade T+1	0.03**	0.02*	0.04***	0.03	-0.32	-0.53	-0.16	-0.57
	(7.09)	(4.22)	(17.90)	(1.30)	(-1.29)	(-1.69)	(-1.87)	(-1.50)
Upgrade T+2	-0.03**	-0.01	-0.03***	-0.00	-0.24	-0.37	-0.14	-0.39
	(-4.31)	(-2.26)	(-17.28)	(-0.05)	(-1.23)	(-1.48)	(-1.48)	(-1.12)
Debt to GDP	0.31*	0.31*	0.31*	0.31*	0.75	0.72	0.78	0.74
	(3.30)	(3.28)	(3.31)	(3.29)	(0.54)	(0.53)	(0.55)	(0.53)
Budget Balance	0.63	0.63	0.62	0.63	3.42	3.33	3.24	3.34
	(1.23)	(1.24)	(1.23)	(1.23)	(0.98)	(0.96)	(0.96)	(0.94)
Political Risk	0.00	0.00	0.00	0.00	0.04*	0.04*	0.04**	0.04*
	(0.92)	(0.95)	(0.93)	(0.93)	(2.58)	(2.63)	(2.79)	(2.58)
Risk Aversion Index	0.01	0.01	0.01	0.01	-0.13	-0.13	-0.12	-0.13
	(0.72)	(0.72)	(0.72)	(0.71)	(-1.09)	(-1.14)	(-1.06)	(-1.12)
Positive Outlook	-0.05**	-0.05**	-0.05**	-0.05**	-0.10	-0.11	-0.08	-0.16***
	(-4.95)	(-4.87)	(-4.87)	(-5.12)	(-1.77)	(-2.00)	(-1.45)	(-7.73)
R-squared	0.37	0.36	0.37	0.36	0.38	0.38	0.37	0.38
Nb of Observations	386	386	386	386	696	696	696	696
Nb of Countries	3	3	3	3	5	5	5	5
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors clustered on country basis. *t* statistics in parentheses. * p<.10, ** p<.05, *** p<.01

Table 12

Impact of Serial Sovereign Rating Upgrades on Investor Holdings and Yields in Peripheral Eurozone

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Foreign Private			Foreign Official			Banks			Investment Fund			Sovereign Yield	
	1st Upg	2nd Upg	3rd Upg	1st Upg	2nd Upg	3rd Upg	1st Upg	2nd Upg	3rd Upg	1st Upg	2nd Upg	3rd Upg	1st Upg	2nd Upg
Upgrade T-2	-0.00	-0.05***	-0.02	0.01	-0.01		0.15	0.24***	-0.93***	0.01	-0.06**		-0.13	-0.05
	(-0.28)	(-6.33)	(-0.97)	(0.59)	(-0.42)		(1.49)	(37.11)	(-8.78)	(0.93)	(-8.32)		(-1.18)	(-0.39)
Upgrade T-1	-0.00	0.04***	0.03*	-0.00	-0.01		-0.09	-0.43***	0.01	0.01	-0.04**		-0.12	-0.14
	(-0.31)	(6.18)	(2.74)	(-0.58)	(-0.42)		(-0.97)	(-65.73)	(0.26)	(0.84)	(-5.43)		(-0.95)	(-0.85)
Upgrade T	-0.01	0.02	0.02	0.00	-0.01		-0.01	0.04	0.03	-0.00	-0.03		-0.16	-0.15
	(-0.44)	(1.55)	(1.19)	(0.01)	(-1.23)		(-0.29)	(1.84)	(0.78)	(-0.04)	(-1.86)		(-1.13)	(-1.03)
Upgrade T+1	0.01	0.05***	-0.28***	0.01	-0.01		0.01	0.07**	0.04	0.05**	-0.03		-0.14	-0.14
	(1.07)	(9.38)	(-11.07)	(0.73)	(-0.59)		(0.17)	(5.55)	(0.54)	(6.65)	(-1.86)		(-1.12)	(-1.08)
Upgrade T+2	0.01	-0.02	0.04*	-0.00	-0.01		-0.11	-0.16***	-0.02	-0.02	-0.06*		-0.13	-0.13
	(0.39)	(-1.56)	(2.94)	(-0.18)	(-0.59)		(-1.27)	(-24.36)	(-0.42)	(-2.11)	(-3.69)		(-1.19)	(-0.86)
Debt to GDP	-0.07	-0.07	-0.08	0.02	0.02	0.02	-0.02	-0.01	-0.06	0.31*	0.32*	0.31*	0.77	0.77
	(-1.35)	(-1.35)	(-1.56)	(0.18)	(0.19)	(0.18)	(-0.21)	(-0.13)	(-0.58)	(3.30)	(3.47)	(3.33)	(0.55)	(0.54)
Budget Balance	-0.12	-0.12	-0.10	0.18	0.18	0.18	-0.24	-0.24	-0.21	0.63	0.64	0.63	3.37	3.22
	(-2.11)	(-2.16)	(-1.88)	(0.90)	(0.90)	(0.91)	(-1.53)	(-1.44)	(-1.71)	(1.24)	(1.28)	(1.25)	(0.99)	(0.94)
Political Risk	-0.00	-0.00	-0.00	0.00	0.00	0.00	-0.00	-0.00	0.00	0.00	0.00	0.00	0.04*	0.04**
	(-1.30)	(-1.31)	(-0.53)	(0.01)	(0.01)	(0.01)	(-1.14)	(-1.10)	(0.07)	(0.95)	(0.95)	(0.95)	(2.77)	(2.80)
Risk Aversion Index	-0.01	-0.01	-0.01*	-0.06***	-0.06***	-0.06***	0.01	0.01	0.01	0.01	0.01	0.01	-0.12	-0.13
	(-2.33)	(-2.31)	(-2.48)	(-13.61)	(-13.45)	(-13.73)	(1.22)	(1.18)	(0.71)	(0.70)	(0.74)	(0.73)	(-1.06)	(-1.07)
Positive Outlook	0.00	-0.00	0.00	0.02	0.02	0.02	0.01	-0.02	-0.01	-0.05**	-0.05**	-0.05**	-0.11*	-0.11*
	(0.16)	(-0.01)	(0.11)	(1.17)	(1.00)	(1.01)	(0.07)	(-0.36)	(-0.27)	(-4.90)	(-4.97)	(-4.93)	(-2.20)	(-2.24)
R-squared	0.41	0.41	0.46	0.61	0.61	0.61	0.35	0.35	0.38	0.37	0.37	0.36	0.37	0.37
Nb of Observations	544	544	544	524	524	524	544	544	544	386	386	386	696	696
Nb of Countries	4	4	4	4	4	4	4	4	4	3	3	3	5	5
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors clustered on country basis. * p<.10, ** p<.05, *** p<.01. *t* statistics in parentheses

Table 13

Impact of Multi-notch Sovereign Rating Upgrades on Investor Holdings and Yields in Peripheral Eurozone

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	Foreign Private			Foreign Official			Banks			Inv. Fund			Sov. Yield		
	1-notch	2-notch	3-notch	1-notch	2-notch	3-notch	1-notch	2-notch	3-notch	1-notch	2-notch	3-notch	1-notch	2-notch	3-notch
Upgrade T-2	-0.00			0.01			-0.04			-0.00			0.63*		
	(-0.38)			(0.61)			(-0.29)			(-0.46)			(2.59)		
Upgrade T-1	0.01			-0.00			-0.07			0.00			-0.20		
	(0.95)			(-0.84)			(-0.81)			(0.11)			(-1.54)		
Upgrade T	0.01			-0.00			-0.00			-0.00			-0.32		
	(0.45)			(-0.09)			(-0.08)			(-0.46)			(-1.49)		
Upgrade T+1	-0.03			0.01			0.03			0.03**			-0.39		
	(-1.26)			(0.70)			(1.05)			(7.09)			(-1.52)		
Upgrade T+2	0.01			-0.00			-0.07			-0.03**			-0.28		
	(0.88)			(-0.31)			(-1.03)			(-4.31)			(-1.34)		
Debt to GDP	-0.07	-0.07	-0.07	0.02	0.02	0.02	-0.04	-0.02	-0.02	0.31*	0.31*	0.31*	0.73	0.76	0.76
	(-1.36)	(-1.36)	(-1.36)	(0.18)	(0.18)	(0.18)	(-0.38)	(-0.18)	(-0.18)	(3.30)	(3.33)	(3.33)	(0.53)	(0.53)	(0.53)
Budget Balance	-0.11	-0.12	-0.12	0.18	0.18	0.18	-0.22	-0.25	-0.25	0.63	0.63	0.63	3.43	3.20	3.20
	(-2.14)	(-2.15)	(-2.15)	(0.91)	(0.91)	(0.91)	(-1.58)	(-1.48)	(-1.48)	(1.23)	(1.25)	(1.25)	(0.97)	(0.95)	(0.95)
Political Risk	-0.00	-0.00	-0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00	0.00	0.00	0.00	0.04*	0.04**	0.04**
	(-1.32)	(-1.32)	(-1.32)	(0.01)	(0.01)	(0.01)	(-0.56)	(-1.12)	(-1.12)	(0.92)	(0.95)	(0.95)	(2.48)	(2.82)	(2.82)
Risk Aversion Index	-0.01	-0.01*	-0.01*	-0.06***	-0.06***	-0.06***	0.01	0.01	0.01	0.01	0.01	0.01	-0.13	-0.13	-0.13
	(-2.29)	(-2.35)	(-2.35)	(-13.65)	(-13.73)	(-13.73)	(0.96)	(1.21)	(1.21)	(0.72)	(0.73)	(0.73)	(-1.13)	(-1.08)	(-1.08)
Positive Outlook	-0.01	-0.00	-0.00	0.02	0.02	0.02	0.00	-0.02	-0.02	-0.05**	-0.05**	-0.05**	-0.10	-0.11*	-0.11*
	(-0.46)	(-0.01)	(-0.01)	(1.14)	(1.01)	(1.01)	(0.06)	(-0.36)	(-0.36)	(-4.95)	(-4.93)	(-4.93)	(-1.51)	(-2.28)	(-2.28)
R-squared	0.42	0.41	0.41	0.61	0.61	0.61	0.35	0.34	0.34	0.37	0.36	0.36	0.39	0.37	0.37
Nb of Observations	544	544	544	524	524	524	544	544	544	386	386	386	696	696	696
Nb of Countries	4	4	4	4	4	4	4	4	4	3	3	3	5	5	5
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors clustered on country basis. *t* statistics in parentheses. * p<.10, ** p<.05, *** p<.01

Table 14

Impact of Sovereign Rating Downgrades on Bond Holdings and Yields in Peripheral Eurozone

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Foreign Private				Foreign Official				Banks		
	Cross	S&P	Fitch	Mdy's	Cross	S&P	Fitch	Mdy's	Cross	S&P	Fitch	Mdy's
Downgrade T-2	-0.02*	-0.03*	0.01	-0.03**	0.03	0.01***	0.00	0.03	0.01	-0.02	0.02	0.04
	(-3.17)	(-2.61)	(0.49)	(-3.63)	(2.11)	(6.20)	(0.37)	(1.56)	(0.37)	(-0.40)	(0.50)	(0.61)
Downgrade T-1	0.02	0.01**	0.01	0.00	-0.01	-0.03	0.02	0.00	0.04	0.04	0.03	0.03
	(2.04)	(3.24)	(0.82)	(0.12)	(-0.45)	(-0.66)	(1.40)	(0.24)	(1.16)	(0.92)	(2.22)	(1.38)
Downgrade T	-0.02	-0.01	-0.03	-0.01	0.00	0.01	-0.02	0.01	-0.03	-0.05	-0.05	0.03
	(-1.73)	(-0.68)	(-2.20)	(-0.63)	(0.06)	(0.56)	(-1.21)	(1.13)	(-1.47)	(-2.09)	(-1.07)	(0.64)
Downgrade T+1	-0.01*	-0.02*	-0.00	-0.01	0.03	0.03	-0.01	0.04	0.00	-0.02	0.05	-0.03
	(-3.11)	(-3.16)	(-1.10)	(-1.73)	(1.62)	(1.75)	(-1.29)	(2.13)	(0.11)	(-0.50)	(2.01)	(-1.24)
Downgrade T+2	-0.00	-0.01	-0.02	-0.01	-0.01	-0.01	0.02	-0.03*	0.03	0.08	0.01	0.05
	(-0.15)	(-0.74)	(-2.29)	(-1.37)	(-0.44)	(-0.22)	(0.74)	(-2.97)	(0.89)	(1.18)	(0.37)	(0.87)
Debt to GDP	-0.06	-0.06	-0.07	-0.05	0.00	-0.00	-0.00	-0.01	-0.01	0.00	-0.01	-0.03
	(-1.39)	(-1.22)	(-1.59)	(-1.29)	(0.01)	(-0.02)	(-0.03)	(-0.05)	(-0.09)	(0.02)	(-0.08)	(-0.23)
Budget Balance	-0.06	-0.02	-0.08	-0.03	0.06	0.03	0.03	0.05	-0.22	-0.19	-0.24	-0.26
	(-0.82)	(-0.23)	(-1.14)	(-0.56)	(0.29)	(0.14)	(0.12)	(0.22)	(-0.93)	(-0.76)	(-1.12)	(-1.18)
GDP Growth Trend	0.18	0.18*	0.14	0.18*	-0.35	-0.30	-0.31	-0.34	-0.03	0.05	-0.01	-0.04
	(2.02)	(2.47)	(1.76)	(2.42)	(-1.96)	(-2.05)	(-1.90)	(-1.98)	(-0.12)	(0.21)	(-0.07)	(-0.17)
Political Risk	-0.00	-0.00	-0.00	-0.00	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00	-0.00
	(-1.81)	(-1.52)	(-1.48)	(-1.60)	(0.53)	(0.17)	(0.29)	(0.69)	(-1.31)	(-1.94)	(-1.40)	(-1.48)
Risk Aversion Index	0.01	0.01	0.00	0.01	-0.08***	-0.07***	-0.08***	-0.08***	0.09	0.08	0.08	0.07
	(1.28)	(0.78)	(0.51)	(1.25)	(-7.93)	(-8.65)	(-7.29)	(-8.89)	(2.00)	(1.89)	(1.67)	(1.49)
Negative Outlook	0.00	-0.00	0.00	0.00	0.02	0.02	0.03	0.02	0.08	0.08	0.09	0.08
	(0.21)	(-0.07)	(0.15)	(0.13)	(0.72)	(0.74)	(0.86)	(0.87)	(1.68)	(1.43)	(1.70)	(1.73)
R-squared	0.44	0.43	0.43	0.43	0.63	0.62	0.62	0.64	0.35	0.35	0.35	0.35
Nb of Observations	544	544	544	544	524	524	524	524	544	544	544	544
Nb of Countries	4	4	4	4	4	4	4	4	4	4	4	4
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors clustered on country basis * p<.10, ** p<.05, *** p<.01. *t* statistics in parentheses

Table 15

Impact of Sovereign Rating Downgrades on Bond Holdings and Yields in Peripheral Eurozone

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Inv. Fund				Sov. Yield		
	Cross	S&P	Fitch	Mdy's	Cross	S&P	Fitch	Mdy's
Downgrade T-2	-0.06	-0.16	-0.02	-0.03	0.23	0.66**	0.29	0.20
	(-1.01)	(-1.04)	(-0.24)	(-1.09)	(1.86)	(3.41)	(1.49)	(1.07)
Downgrade T-1	0.05	0.04	-0.01	0.02	0.00	0.11	0.07	-0.09
	(1.70)	(1.41)	(-0.26)	(0.88)	(0.02)	(0.54)	(0.32)	(-0.26)
Downgrade T	-0.02	0.03	-0.03	-0.01	0.18**	0.22	0.42*	0.12
	(-1.02)	(1.27)	(-1.03)	(-0.32)	(3.99)	(2.05)	(2.46)	(0.86)
Downgrade T+1	0.05	-0.02	0.07	0.03	0.03	0.20	-0.04	0.13
	(1.85)	(-1.49)	(2.40)	(1.36)	(0.24)	(0.92)	(-0.11)	(1.48)
Downgrade T+2	-0.04	0.14	-0.20	0.06	-0.05	0.15	-0.16	0.01
	(-1.31)	(1.98)	(-2.12)	(1.07)	(-0.25)	(0.42)	(-0.68)	(0.03)
Debt to GDP	0.34**	0.41*	0.29**	0.37*	0.72	0.71	0.76	0.71
	(5.90)	(4.22)	(9.78)	(4.24)	(0.54)	(0.60)	(0.59)	(0.53)
Budget Balance	0.72	1.26	0.41	0.93	2.75	2.45	2.84	2.77
	(1.94)	(1.48)	(2.52)	(1.78)	(0.88)	(0.90)	(0.91)	(0.87)
GDP Growth Trend	0.27	0.43	0.19	0.30	-2.66	-2.96	-2.51	-2.38
	(1.70)	(1.53)	(1.79)	(1.47)	(-1.06)	(-1.11)	(-0.92)	(-0.89)
Political Risk	0.00	0.00	0.00	0.00	0.04**	0.04**	0.04**	0.04**
	(1.04)	(0.86)	(1.09)	(1.10)	(3.25)	(3.61)	(3.20)	(3.18)
Risk Aversion Index	0.04	0.04	0.02	0.02	-0.17	-0.13	-0.16	-0.15
	(1.67)	(2.11)	(2.02)	(1.02)	(-1.52)	(-1.29)	(-1.77)	(-1.44)
Negative Outlook	0.01	-0.01	-0.01	-0.02	-0.26	-0.18	-0.27*	-0.25
	(0.35)	(-0.44)	(-0.61)	(-0.65)	(-1.88)	(-1.40)	(-2.17)	(-1.88)
R-squared	0.39	0.41	0.42	0.37	0.38	0.40	0.39	0.38
Nb of Observations	386	386	386	386	696	696	696	696
Nb of Countries	3	3	3	3	5	5	5	5
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors clustered on country basis. *t* statistics in parentheses. p<.10, ** p<.05, *** p<.01

Table 16

Impact of Serial Sovereign Rating Downgrades on Bond Holdings and Yields in Peripheral Eurozone

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	Foreign Private			Foreign Official			Banks			Investment Fund			Sovereign Yield		
	1st Dg.	2nd Dg.	3rd Dg.	1st Dg.	2nd Dg.	3rd Dg.	1st Dg.	2nd Dg.	3rd Dg.	1st Dg.	2nd	3rd Dg.	1st Dg.	2nd	3rd Dg.
Downgrade T-2	-0.01	-0.02	-0.02	0.03	0.08	0.02	-0.01	0.18	-0.03*	-0.01	0.00	-0.31	-0.17	-0.08	0.93***
	(-0.79)	(-0.49)	(-2.34)	(1.41)	(1.28)	(1.14)	(-0.14)	(1.37)	(-2.49)	(-0.51)	(0.00)	(-1.40)	(-0.76)	(-0.16)	(5.01)
Downgrade T-1	0.00	0.03	0.01	-0.01	-0.04	0.01	0.01	0.09	0.05	0.04	0.07	-0.07	0.13	0.19	-0.22
	(0.36)	(1.16)	(0.62)	(-0.22)	(-1.65)	(0.91)	(0.37)	(0.83)	(1.10)	(1.91)	(0.91)	(-1.34)	(1.84)	(0.52)	(-0.63)
Downgrade T	-0.00	-0.02	-0.03***	0.02	-0.00	-0.03	-0.01	-0.12	0.00	0.02	-0.16	0.07	-0.15	0.74	0.24
	(-0.18)	(-0.98)	(-6.93)	(1.15)	(-0.14)	(-0.87)	(-0.25)	(-1.06)	(0.03)	(0.36)	(-0.86)	(1.34)	(-0.67)	(2.00)	(0.93)
Downgrade T+1	-0.01	-0.01	-0.02	0.02*	0.06	0.00	0.00	0.05	-0.03	0.05	0.07	0.07	-0.13	0.19	0.25
	(-1.22)	(-0.68)	(-1.42)	(2.94)	(0.98)	(0.38)	(0.19)	(1.89)	(-0.60)	(0.91)	(0.68)	(0.93)	(-0.56)	(0.99)	(1.16)
Downgrade T+2	-0.01	0.01	-0.00	0.02	-0.03**	-0.04**	0.02	0.00	0.07	-0.06	-0.13	0.31	0.13	-0.05	-0.35
	(-1.51)	(0.55)	(-0.05)	(0.80)	(-3.73)	(-4.65)	(0.99)	(0.02)	(0.99)	(-0.59)	(-0.71)	(1.74)	(1.76)	(-0.17)	(-0.96)
Debt to GDP	-0.06	-0.06	-0.05	-0.00	0.00	-0.03	-0.01	-0.01	-0.00	0.34**	0.35**	0.52	0.74	0.78	0.67
	(-1.22)	(-1.26)	(-1.35)	(-0.02)	(0.01)	(-0.21)	(-0.07)	(-0.10)	(-0.02)	(5.55)	(5.80)	(2.50)	(0.55)	(0.57)	(0.54)
Budget Balance	-0.04	-0.04	-0.03	0.07	0.05	-0.07	-0.23	-0.21	-0.19	0.77	0.75	1.63	2.64	2.72	2.44
	(-0.50)	(-0.55)	(-0.59)	(0.34)	(0.28)	(-0.28)	(-0.81)	(-1.22)	(-0.99)	(1.77)	(1.78)	(1.46)	(0.79)	(0.84)	(0.86)
GDP Growth Trend	0.17	0.15	0.16*	-0.36*	-0.30	-0.34	0.02	0.02	0.05	0.22	0.31	0.66	-2.22	-2.57	-2.50
	(1.72)	(1.63)	(2.68)	(-2.55)	(-1.92)	(-2.33)	(0.08)	(0.10)	(0.28)	(2.53)	(1.94)	(1.55)	(-0.81)	(-0.95)	(-0.92)
Political Risk	-0.00	-0.00	-0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00	0.00	0.00	0.00	0.04**	0.04**	0.04**
	(-1.54)	(-1.36)	(-1.44)	(1.14)	(0.39)	(0.55)	(-1.40)	(-1.48)	(-1.71)	(0.95)	(0.88)	(1.00)	(3.43)	(3.35)	(3.27)
Risk Aversion	0.01	0.01	0.01	-0.08***	-0.08***	-0.08***	0.08	0.08	0.08	0.03*	0.03*	0.06	-0.08	-0.12	-0.17*
	(0.70)	(0.68)	(0.81)	(-6.62)	(-9.16)	(-7.89)	(1.71)	(1.68)	(1.73)	(3.50)	(2.98)	(1.91)	(-0.93)	(-1.04)	(-2.14)
Negative Outlook	0.00	-0.00	-0.00	0.02	0.03	0.02	0.08	0.07	0.08	-0.01	-0.02	0.00	-0.19	-0.23	-0.25
	(0.03)	(-0.25)	(-0.01)	(0.73)	(1.00)	(0.82)	(1.31)	(1.45)	(1.47)	(-0.81)	(-0.56)	(0.01)	(-1.71)	(-1.88)	(-2.03)
R-squared	0.42	0.42	0.44	0.63	0.63	0.62	0.34	0.36	0.35	0.38	0.40	0.42	0.38	0.39	0.41
Nb of Observations	544	544	544	524	524	524	544	544	544	386	386	386	696	696	696
Nb of Countries	4	4	4	4	4	4	4	4	4	3	3	3	5	5	5
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

t statistics in parentheses. Note: Standard errors clustered on country basis. * p<.10, ** p<.05, *** p<.01

Table 17

Impact of Multi-notch Sovereign Rating Downgrades on Bond Holdings and Yields in Peripheral Eurozone

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	Foreign Private			Foreign Official			Banks			Inv. Fund			Sov. Yield		
	1-notch	2-notch	3-notch	1-notch	2-notch	3-notch	1-notch	2-notch	3-	1-	2-	3-	1-	2-notch	3-
Downgrade T-2	-0.01	-0.02	0.02*	0.02	0.01	0.01	0.01	0.02	0.02**	0.01	0.02	-0.15	0.21	0.01	-0.03
	(-2.11)	(-2.19)	(2.40)	(1.33)	(1.33)	(0.96)	(0.12)	(0.70)	(4.51)	(0.43)	(0.29)	(-0.80)	(1.74)	(0.03)	(-0.17)
Downgrade T-1	0.01	0.02***	0.03	0.02	-0.02	0.01	0.00	-0.03	0.08**	0.07	-0.07	-0.07	0.13	-0.31	-0.39
	(1.05)	(6.38)	(1.42)	(0.65)	(-1.02)	(0.93)	(0.27)	(-0.53)	(3.36)	(1.09)	(-0.79)	(-1.11)	(0.88)	(-1.13)	(-1.06)
Downgrade T	-0.01	-0.01	-0.02**	0.00	-0.01	-0.00	-0.03	0.01	0.00	0.03	0.05	-0.01	0.09	-0.28**	0.31
	(-0.52)	(-0.41)	(-3.34)	(0.06)	(-0.32)	(-0.42)	(-1.05)	(1.02)	(0.15)	(1.73)	(1.03)	(-0.37)	(0.88)	(-3.41)	(1.00)
Downgrade T+1	-0.02***	0.01	-0.03	0.02*	0.00	0.03	0.01	0.00	0.01	0.02	0.02	0.04	0.15	-0.15	0.39
	(-6.33)	(1.45)	(-2.03)	(2.86)	(0.44)	(1.74)	(0.30)	(0.04)	(0.28)	(0.58)	(1.22)	(1.14)	(1.33)	(-0.47)	(1.83)
Downgrade T+2	0.01	-0.00	-0.03***	-0.01	0.00	-0.01	-0.02	0.08	0.04	0.01	-0.01	0.13	-0.02	-0.03	-0.20
	(1.56)	(-0.62)	(-6.10)	(-0.27)	(0.08)	(-0.84)	(-0.27)	(1.89)	(0.48)	(1.03)	(-0.45)	(0.68)	(-0.10)	(-0.12)	(-0.51)
Debt to GDP	-0.06	-0.05	-0.06	-0.01	-0.01	-0.01	-0.01	-0.00	-0.02	0.33**	0.34**	0.40	0.76	0.67	0.76
	(-1.18)	(-1.08)	(-1.32)	(-0.09)	(-0.05)	(-0.09)	(-0.10)	(-0.05)	(-0.28)	(6.88)	(4.86)	(2.83)	(0.58)	(0.52)	(0.54)
Budget Balance	-0.02	-0.03	-0.11	0.00	0.02	0.01	-0.24	-0.24	-0.18	0.76	0.73	1.19	2.62	2.58	2.77
	(-0.24)	(-0.33)	(-1.67)	(0.01)	(0.10)	(0.04)	(-0.78)	(-0.92)	(-1.39)	(1.78)	(1.79)	(0.97)	(0.84)	(0.79)	(0.82)
GDP Growth	0.18	0.15	0.13	-0.38*	-0.29	-0.31	0.06	-0.02	-0.03	0.03	0.26	0.45	-2.78	-1.76	-2.31
	(2.03)	(1.70)	(1.92)	(-2.41)	(-2.13)	(-1.91)	(0.26)	(-0.14)	(-0.13)	(0.20)	(1.86)	(0.90)	(-0.95)	(-0.60)	(-0.83)
Political Risk	-0.00	-0.00	-0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00	0.01	0.00	0.00	0.04**	0.03**	0.04**
	(-1.57)	(-1.31)	(-1.69)	(0.81)	(0.18)	(0.01)	(-1.40)	(-1.10)	(-1.09)	(1.11)	(0.99)	(0.87)	(3.27)	(3.05)	(3.26)
Risk Aversion	0.01	0.01	0.00	-0.08***	-0.07***	-0.08***	0.09	0.08	0.08	0.02	0.03	0.04	-0.15	-0.11	-0.12
	(0.93)	(0.73)	(0.48)	(-8.03)	(-9.38)	(-7.83)	(1.85)	(1.72)	(1.78)	(1.12)	(2.28)	(1.07)	(-1.60)	(-0.93)	(-1.08)
Negative Outlook	0.00	0.00	-0.00	0.02	0.02	0.03	0.07	0.08	0.07	-0.02	-0.02	-0.02	-0.25*	-0.28	-0.22
	(0.20)	(0.08)	(-0.05)	(0.81)	(0.77)	(0.83)	(1.36)	(1.54)	(1.40)	(-0.95)	(-0.47)	(-0.40)	(-2.15)	(-1.87)	(-1.83)
R-squared	0.42	0.43	0.45	0.62	0.62	0.62	0.34	0.35	0.35	0.38	0.38	0.39	0.38	0.39	0.39
Nb of	544	544	544	524	524	524	544	544	544	386	386	386	696	696	696
Nb of Countries	4	4	4	4	4	4	4	4	4	3	3	3	5	5	5
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

t statistics in parentheses. Note: Standard errors clustered on country basis * p<.10, ** p<.05, *** p<.01

Table 18

Impact of Sovereign Rating Upgrades on Bond Holdings and Yields in Emerging Economies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
		Foreign Private				Banks				Pension & Ins				Sov. Yield		
	Cross	S&P	Fitch	Mdy's	Cross	S&P	Fitch	Mdy's	Cross	S&P	Fitch	Mdy's	Cross	S&P	Fitch	Mdy's
Upgrade T-2	-0.03	-0.03	-0.01	-0.06	-0.02	-0.04	0.02	-0.01	-0.03	-0.02	-0.01	-	0.03	-	0.41	-0.06
	(-1.50)	(-0.86)	(-0.40)	(-1.40)	(-	(-	(1.23)	(-	(-	(-	(-	(-2.31)	(0.19)	(-2.80)	(0.71)	(-
Upgrade T-1	0.01	-0.02	0.03	0.01	0.00	0.00	-0.02	0.01	0.02	-0.00	0.01	0.04*	-0.06	-0.02	-0.11	0.03
	(0.37)	(-0.99)	(0.90)	(0.40)	(0.45)	(0.17)	(-	(0.58)	(1.06)	(-	(0.35)	(1.95)	(-	(-0.19)	(-	(0.34)
Upgrade T	-0.01	0.01	-0.03	-0.02	-0.00	-0.00	0.00	-0.00	-0.01	0.00	-0.05	0.01	0.08	0.00	-0.13	0.36
	(-0.83)	(0.60)	(-1.40)	(-0.55)	(-	(-	(0.25)	(-	(-	(0.12)	(-	(0.25)	(0.72)	(0.04)	(-	(1.55)
Upgrade T+1	0.02	0.04	-0.03	0.03	-0.01	-0.01	0.00	-0.01	-0.04	-0.02	0.00	-0.09	0.11	-0.12**	-0.02	0.42
	(0.46)	(0.51)	(-1.31)	(1.01)	(-	(-	(0.33)	(-	(-	(-	(0.01)	(-1.21)	(0.68)	(-2.26)	(-	(1.09)
Upgrade T+2	-0.00	-0.02	-0.01	0.04	-0.00	-0.01	0.00	-0.01	0.02	0.02	-0.01	0.03	-0.02	-0.04	0.07	-0.02
	(-0.27)	(-0.74)	(-1.02)	(1.08)	(-	(-	(0.66)	(-	(0.86)	(1.31)	(-	(0.47)	(-	(-0.40)	(0.71)	(-
Budget Balance	0.11	0.11	0.11	0.11	0.02	0.02	0.02	0.03	0.13	0.11	0.11	0.12	-0.12	-0.12	-0.12	-0.14
	(0.65)	(0.65)	(0.63)	(0.63)	(0.15)	(0.14)	(0.16)	(0.17)	(1.19)	(1.05)	(1.06)	(1.10)	(-	(-0.81)	(-	(-
GDP Growth	-0.23	-0.23	-0.23	-0.24*	0.05	0.05	0.05	0.05	-0.11	-0.11	-0.12	-0.10	0.98	1.17	1.02	0.95
	(-1.63)	(-1.63)	(-1.60)	(-1.67)	(0.54)	(0.59)	(0.48)	(0.49)	(-	(-	(-	(-0.61)	(1.35)	(1.59)	(1.49)	(1.33)
Risk Aversion	-	-	-	-	0.00	0.00	0.01	0.00	-0.00	-0.00	-0.00	-0.00	-0.06*	-0.06*	-0.06*	-0.05*
	(-3.23)	(-3.21)	(-3.12)	(-3.20)	(1.53)	(1.57)	(1.58)	(1.54)	(-	(-	(-	(-0.79)	(-	(-1.84)	(-	(-
Positive Outlook	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.00	-0.00	-0.00	-0.00	-0.04	-0.02	-0.01	-0.04
	(1.01)	(1.05)	(1.08)	(1.04)	(0.73)	(0.79)	(0.64)	(0.63)	(0.04)	(-	(-	(-0.16)	(-	(-0.19)	(-	(-
R-squared																
Nb of	1392	1392	1392	1392	1423	1423	1423	1423	929	929	929	929	1842	1807	1814	1826
Nb of Countries	12	12	12	12	12	12	12	12	10	10	10	10	12	12	12	12
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors clustered on country basis. t statistics in parentheses. * p<.10, ** p<.05, *** p<.01

Table 19

Impact of Serial Sovereign Rating Upgrades on Investor Holdings and Yields in Emerging Markets

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Foreign Private			Banks			Pension & Ins			Sov. Yield		
	1st Upg	2nd Upg	3rd Upg	1st Upg	2nd Upg	3rd Upg	1st Upg	2nd Upg	3rd Upg	1st Upg	2nd Upg	3rd Upg
Upgrade T-2	0.00	-0.13*	0.05	-0.03	0.02	0.02	-0.02	0.02	-0.01	-0.10	-0.19***	-0.01
	(0.03)	(-1.99)	(1.78)	(-0.96)	(0.98)	(0.80)	(-0.54)	(0.56)	(-0.63)	(-1.52)	(-3.29)	(-0.15)
Upgrade T-1	-0.02	0.02	0.08	0.00	-0.01	-0.02	-0.00	-0.00	0.00	0.02	-0.11	2.32***
	(-0.78)	(0.46)	(1.63)	(0.60)	(-0.96)	(-1.00)	(-0.31)	(-0.60)	(0.01)	(0.37)	(-1.46)	(30.01)
Upgrade T	0.00	-0.03	0.03	0.00	-0.03	0.05*	0.03	-0.00	-0.03***	0.01	0.31**	3.01***
	(0.13)	(-0.47)	(0.94)	(0.38)	(-1.02)	(2.16)	(1.36)	(-0.24)	(-4.22)	(0.14)	(2.49)	(35.87)
Upgrade T+1	0.05	0.02	0.26***	-0.01	0.01	0.03	-0.01	0.00	0.07**	0.24	0.09	-0.11
	(1.18)	(0.26)	(6.83)	(-0.79)	(0.58)	(1.36)	(-0.82)	(0.10)	(2.81)	(1.46)	(0.53)	(-1.70)
Upgrade T+2	-0.01	-0.03	0.41***	0.00	0.00	-0.07***	0.03	-0.00	-0.06	0.02	-0.07	0.37***
	(-0.64)	(-1.50)	(7.94)	(0.21)	(0.29)	(-4.38)	(1.25)	(-0.04)	(-1.69)	(0.51)	(-0.66)	(4.49)
Debt to GDP	0.01	0.01	0.00	-0.03**	-0.03*	-0.03*	-0.00	-0.00	-0.00	0.14*	0.12	0.12*
	(0.26)	(0.48)	(0.12)	(-2.26)	(-2.11)	(-2.07)	(-0.03)	(-0.15)	(-0.13)	(2.00)	(1.75)	(1.84)
Budget Balance	0.04	0.03	0.06	0.03	0.01	0.01	-0.15*	-0.14*	-0.14*	-1.04	-0.97	-0.87
	(0.19)	(0.16)	(0.35)	(0.42)	(0.15)	(0.15)	(-2.20)	(-1.93)	(-1.95)	(-1.59)	(-1.45)	(-1.78)
Political Risk	-0.00	0.00	0.00	-0.00	-0.00	-0.00	0.00*	0.00	0.00	-0.00	-0.00	-0.00
	(-0.11)	(0.03)	(0.07)	(-0.65)	(-0.57)	(-0.57)	(1.90)	(1.68)	(1.70)	(-0.53)	(-0.44)	(-0.24)
Risk Aversion Index	-0.02	-0.02	-0.02	-0.04	-0.04	-0.04	-0.01**	-0.01**	-0.01**	-0.44***	-0.44***	-0.43***
	(-0.86)	(-0.85)	(-0.83)	(-0.68)	(-0.68)	(-0.68)	(-2.45)	(-2.52)	(-2.51)	(-4.49)	(-4.52)	(-4.56)
Positive Outlook	-0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.01	0.01	-0.06	-0.04	-0.05
	(-0.18)	(0.22)	(0.08)	(0.20)	(0.11)	(0.12)	(0.88)	(0.79)	(0.80)	(-0.83)	(-0.89)	(-0.84)
R-squared	0.17	0.17	0.18	0.12	0.12	0.12	0.13	0.12	0.12	0.22	0.22	0.24
Nb of Observations	1319	1319	1319	1337	1337	1337	1129	1129	1129	1467	1467	1467
Nb of Countries	12	12	12	12	12	12	11	11	11	12	12	12
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors clustered on country basis. *t* statistics in parentheses. * p<.10, ** p<.05, *** p<.01

Table 20

Impact of Multi-notch Sovereign Rating Upgrades on Investor Holdings and Yields in Emerging Markets

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Foreign Private			Banks			Pension & Ins			Sov. Yield	
	1-notch	2-notch	3-notch	1-notch	2-notch	3-notch	1-notch	2-notch	3-notch	1-notch	2-notch	3-notch
Upgrade T-2	-0.02	-0.01	-0.06	-0.00	-0.04	-0.01	0.00	-0.04	-0.02	-0.04	-0.09	-0.27***
	(-1.13)	(-0.38)	(-1.08)	(-0.50)	(-0.65)	(-0.24)	(0.29)	(-0.78)	(-1.16)	(-1.07)	(-1.34)	(-3.60)
Upgrade T-1	-0.01	0.00	0.07	-0.00	-0.01	-0.03	0.00	-0.02*	0.02**	0.13**	0.17	0.13
	(-0.54)	(0.08)	(0.98)	(-0.08)	(-0.72)	(-1.39)	(0.11)	(-2.09)	(2.59)	(2.50)	(1.10)	(0.81)
Upgrade T	0.00	0.01	-0.04	0.01	0.01	-0.00	0.01	0.05	-0.06***	0.02	0.29	0.04
	(0.01)	(0.46)	(-0.24)	(0.65)	(0.89)	(-0.05)	(1.21)	(0.98)	(-8.67)	(0.66)	(1.17)	(0.38)
Upgrade T+1	0.03	0.04**	0.16	-0.01	0.01	0.04	-0.01	0.02*	-0.02	0.16	0.07	-0.09
	(1.08)	(2.41)	(1.24)	(-0.97)	(0.68)	(1.70)	(-0.89)	(1.86)	(-1.48)	(1.29)	(1.13)	(-1.28)
Upgrade T+2	0.01	0.03	0.06	0.02	0.00	-0.02	0.04	0.00	-0.01	0.00	0.05	-0.04
	(0.25)	(0.87)	(1.65)	(0.59)	(0.53)	(-0.99)	(1.06)	(0.19)	(-0.72)	(0.02)	(0.94)	(-0.22)
Debt to GDP	0.01	0.01	0.00	-0.02*	-0.03*	-0.03*	-0.00	-0.00	-0.00	0.15*	0.16*	0.13*
	(0.33)	(0.25)	(0.10)	(-1.90)	(-2.13)	(-2.04)	(-0.12)	(-0.14)	(-0.09)	(2.15)	(2.09)	(1.80)
Budget Balance	0.04	0.06	0.05	0.00	0.01	0.01	-0.15*	-0.13	-0.14*	-1.10	-0.98	-1.00
	(0.21)	(0.29)	(0.26)	(0.07)	(0.25)	(0.13)	(-1.99)	(-1.73)	(-1.95)	(-1.55)	(-1.65)	(-1.45)
Political Risk	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00
	(-0.18)	(-0.12)	(-0.07)	(-0.68)	(-0.57)	(-0.58)	(1.65)	(1.75)	(1.71)	(-0.52)	(-0.44)	(-0.41)
Risk Aversion Index	-0.02	-0.02	-0.02	-0.04	-0.04	-0.04	-0.03	-0.01**	-0.01**	-0.44***	-0.44***	-0.44***
	(-0.88)	(-0.84)	(-0.85)	(-0.67)	(-0.68)	(-0.68)	(-1.35)	(-2.44)	(-2.55)	(-4.56)	(-4.49)	(-4.52)
Positive Outlook	-0.00	-0.00	-0.00	0.00	0.00	0.00	0.01	0.01	0.01	-0.04	-0.04	-0.04
	(-0.03)	(-0.12)	(-0.01)	(0.12)	(0.03)	(0.18)	(0.81)	(0.82)	(0.81)	(-0.79)	(-0.76)	(-0.87)
R-squared	0.17	0.17	0.17	0.12	0.12	0.12	0.13	0.13	0.12	0.22	0.22	0.22
Nb of Observations	1319	1319	1319	1337	1337	1337	1129	1129	1129	1467	1467	1467
Nb of Countries	12	12	12	12	12	12	11	11	11	12	12	12
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

t statistics in parentheses. Note: Standard errors clustered on country basis. * p<.10, ** p<.05, *** p<.01

Table 21

Impact of Sovereign Rating Downgrades on Bond Holdings and Yields in Emerging Economies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Foreign Private				Banks				Pension & Ins				Sov. Yield			
	Cross	S&P	Fitch	Mdy's	Cross	S&P	Fitch	Mdy's	Cross	S&P	Fitch	Mdy's	Cross	S&P	Fitch	Mdy's
Downgrade T-2	-0.03	-0.07	0.04	0.02	0.01	0.04	-0.04	-0.00	0.00	0.01	-0.02	0.01	0.07	0.14*	0.25***	0.01
	(-1.00)	(-1.09)	(1.13)	(0.61)	(0.60)	(1.06)	(-1.65)	(-0.05)	(0.32)	(0.55)	(-0.63)	(0.79)	(1.48)	(1.96)	(3.89)	(0.14)
Downgrade T-1	0.03	0.00	0.04**	0.04	-0.02**	-0.04	-0.02	-0.01	0.02**	0.02	0.01	0.03*	0.11	0.19	0.55***	0.06
	(0.86)	(0.06)	(2.46)	(1.51)	(-2.52)	(-1.68)	(-1.50)	(-0.54)	(2.50)	(0.83)	(0.93)	(2.22)	(1.35)	(1.76)	(5.65)	(0.55)
Downgrade T	-0.04	-0.03	0.02	-0.04	0.00	0.03	-0.05**	-0.02	-0.02	-0.01	-0.03**	-0.02	0.16	0.20	0.66***	0.21
	(-0.77)	(-0.73)	(1.40)	(-0.90)	(0.05)	(0.66)	(-2.40)	(-1.21)	(-1.39)	(-0.34)	(-2.49)	(-0.84)	(1.44)	(1.24)	(5.17)	(1.59)
Downgrade T+1	-0.01	-0.03	-0.11***	-0.03	-0.02	0.01	-0.02	-0.03	-0.02	-0.00	-0.05*	-0.02	-0.04	-0.12	-0.09	0.01
	(-0.42)	(-0.73)	(-4.61)	(-1.28)	(-1.24)	(0.48)	(-0.57)	(-1.03)	(-1.18)	(-0.12)	(-1.99)	(-1.05)	(-0.50)	(-0.98)	(-0.79)	(0.10)
Downgrade T+2	-0.01	-0.00	-0.02	-0.02	-0.00	-0.04	0.00	0.00	0.02	0.00	0.01	0.01	-0.01	0.01	0.07	-0.02
	(-0.54)	(-0.13)	(-1.48)	(-0.73)	(-0.12)	(-0.94)	(0.30)	(0.01)	(1.13)	(0.02)	(0.55)	(0.58)	(-0.24)	(0.12)	(0.99)	(-0.21)
Debt to GDP	0.01	0.01	0.02	0.01	-0.03*	-0.03	-0.03	-0.03	0.01	0.01	0.01	0.01	0.28**	0.28**	0.27**	0.29**
	(0.43)	(0.36)	(0.49)	(0.44)	(-1.81)	(-1.79)	(-1.55)	(-1.79)	(0.68)	(0.75)	(0.98)	(0.69)	(2.69)	(2.78)	(2.62)	(2.81)
Budget Balance	0.05	0.05	0.06	0.04	0.01	0.01	0.00	-0.00	-0.11**	-0.11**	-0.11*	-0.10**	-0.70	-0.67	-0.69	-0.67
	(0.22)	(0.22)	(0.28)	(0.17)	(0.21)	(0.17)	(0.03)	(-0.09)	(-2.30)	(-2.30)	(-2.21)	(-2.33)	(-1.00)	(-0.96)	(-0.92)	(-0.91)
GDP Growth Trend	0.07	0.05	0.08	0.08	-0.04	-0.04	-0.05	-0.04	0.20***	0.20***	0.18***	0.20***	1.99**	2.01**	2.02**	1.90**
	(0.36)	(0.29)	(0.40)	(0.41)	(-0.40)	(-0.42)	(-0.48)	(-0.40)	(3.78)	(4.03)	(3.21)	(3.72)	(2.77)	(2.84)	(2.87)	(2.65)
Political Risk	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00	-0.00
	(-0.14)	(-0.18)	(-0.15)	(-0.11)	(-0.53)	(-0.50)	(-0.49)	(-0.49)	(1.20)	(1.20)	(1.18)	(1.20)	(-0.88)	(-0.83)	(-0.86)	(-0.87)
Risk Aversion Index	-0.04	-0.04	-0.04	-0.02	-0.05	-0.05	-0.05	-0.03	-0.03	-0.03	-0.03	-0.01***	0.02	0.03	-0.00	-0.49***
	(-1.25)	(-1.19)	(-1.25)	(-0.76)	(-1.11)	(-1.14)	(-1.11)	(-0.64)	(-1.52)	(-1.48)	(-1.48)	(-3.91)	(0.32)	(0.51)	(-0.01)	(-4.53)
Negative Outlook	-0.00	-0.00	-0.01	-0.01	-0.00	-0.00	0.00	-0.00	0.01	0.00	0.01	0.00	0.35	0.36	0.30	0.36
	(-0.16)	(-0.15)	(-0.65)	(-0.38)	(-0.08)	(-0.19)	(0.57)	(-0.07)	(0.31)	(0.23)	(0.38)	(0.23)	(1.69)	(1.71)	(1.46)	(1.74)
R-squared	0.17	0.17	0.17	0.17	0.12	0.12	0.12	0.12	0.13	0.12	0.12	0.13	0.22	0.23	0.23	0.22
Nb of Observations	1319	1319	1319	1319	1337	1337	1337	1337	1129	1129	1129	1129	1467	1462	1467	1467
Nb of Countries	12	12	12	12	12	12	12	12	11	11	11	11	12	12	12	12
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors clustered on country basis. *t* statistics in parentheses. * p<.10, ** p<.05, *** p<.01

Table 22

Impact of Serial Sovereign Rating Downgrades on Bond Holdings and Yields in Emerging Economies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Foreign Private			Banks			Pension & Ins			Sov. Yield		
	1st Dg.	2nd Dg.	3rd Dg.	1st Dg.	2nd Dg.	3rd Dg.	1st Dg.	2nd Dg.	3rd Dg.	1st Dg.	2nd Dg.	3rd Dg.
Downgrade T-2	-0.04	-0.01	0.04	0.01	0.03	0.00	0.00	0.02	0.00	0.05	0.08	0.16***
	(-1.00)	(-0.35)	(1.37)	(1.27)	(0.35)	(0.07)	(0.27)	(0.36)	(0.09)	(1.72)	(0.51)	(3.23)
Downgrade T-1	0.03	0.02	0.06*	-0.03**	0.02	-0.04**	0.02	0.06	0.01	0.06	0.15	0.56**
	(0.66)	(0.49)	(1.91)	(-2.55)	(0.69)	(-2.74)	(1.75)	(1.54)	(0.48)	(0.93)	(0.79)	(2.34)
Downgrade T	-0.06	-0.02	0.03**	0.01	0.03	-0.07**	-0.02	-0.01	-0.02	0.07	0.17	0.94***
	(-0.86)	(-0.90)	(2.28)	(0.38)	(0.46)	(-2.76)	(-1.30)	(-0.27)	(-1.63)	(0.84)	(1.46)	(6.07)
Downgrade T+1	0.02	-0.05	-0.17***	-0.02	-0.05	0.06	-0.01	-0.04	-0.01	0.00	-0.01	-0.43**
	(0.46)	(-1.59)	(-6.57)	(-1.21)	(-1.41)	(1.42)	(-0.96)	(-0.99)	(-1.64)	(0.01)	(-0.05)	(-2.21)
Downgrade T+2	-0.01	0.02	-0.05	0.01	-0.03	-0.04	0.03	0.02	-0.04	-0.03	0.06	-0.08
	(-0.88)	(0.71)	(-1.17)	(0.66)	(-0.39)	(-0.87)	(1.19)	(0.41)	(-1.14)	(-0.54)	(0.36)	(-0.51)
Debt to GDP	0.01	0.01	0.02	-0.03*	-0.03*	-0.03*	0.01	0.01	0.01	0.29**	0.28**	0.30**
	(0.39)	(0.43)	(0.48)	(-1.84)	(-1.82)	(-1.83)	(0.70)	(0.75)	(0.75)	(2.87)	(2.83)	(3.05)
Budget Balance	0.06	0.04	0.06	0.01	0.00	0.01	-0.12**	-0.10**	-0.11*	-0.74	-0.60	-0.75
	(0.26)	(0.16)	(0.25)	(0.26)	(0.01)	(0.14)	(-2.47)	(-3.03)	(-2.21)	(-1.02)	(-0.76)	(-1.01)
GDP Growth Trend	0.08	0.08	0.08	-0.03	-0.04	-0.04	0.19***	0.21***	0.19***	1.88**	1.96**	1.97**
	(0.42)	(0.41)	(0.39)	(-0.34)	(-0.35)	(-0.42)	(3.61)	(3.96)	(3.37)	(2.62)	(2.70)	(2.86)
Political Risk	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00
	(-0.17)	(-0.13)	(-0.19)	(-0.55)	(-0.46)	(-0.48)	(1.15)	(1.15)	(1.17)	(-0.83)	(-0.87)	(-0.90)
Risk Aversion Index	-0.04	-0.04	-0.04	-0.05	-0.05	-0.05	-0.03	-0.03	-0.03	0.01	0.02	0.01
	(-1.23)	(-1.21)	(-1.23)	(-1.12)	(-1.17)	(-1.12)	(-1.48)	(-1.55)	(-1.48)	(0.30)	(0.34)	(0.30)
Negative Outlook	-0.00	-0.01	-0.01	-0.00	-0.00	0.00	0.01	0.01	0.01	0.37	0.37	0.32
	(-0.22)	(-0.32)	(-0.65)	(-0.12)	(-0.34)	(0.38)	(0.24)	(0.39)	(0.26)	(1.70)	(1.67)	(1.57)
R-squared	0.17	0.17	0.17	0.12	0.12	0.12	0.12	0.13	0.12	0.22	0.22	0.23
Nb of Observations	1319	1319	1319	1337	1337	1337	1129	1129	1129	1467	1467	1467
Nb of Countries	12	12	12	12	12	12	11	11	11	12	12	12
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

t statistics in parentheses. Note: Standard errors clustered on country basis. * p<.10, ** p<.05, *** p<.01

Table 23

Impact of Multi-notch Sovereign Rating Downgrades on Bond Holdings and Yields in Emerging Markets

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Foreign Private			Banks			Pension & Ins			Sov. Yield	
	1-notch	2-notch	3-notch	1-notch	2-notch	3-notch	1-notch	2-notch	3-notch	1-notch	2-notch	3-notch
Downgrade T-2	-0.03	0.01	-0.01	0.02	-0.01	-0.05***	0.01	-0.01	-0.00	0.01	0.15**	0.00
	(-0.79)	(0.83)	(-0.38)	(1.24)	(-0.61)	(-4.81)	(0.88)	(-1.32)	(-0.41)	(0.26)	(2.53)	(0.03)
Downgrade T-1	0.05	-0.02	0.08***	-0.02*	0.00	0.01	0.02**	0.01	-0.00	0.00	0.30*	0.09
	(1.13)	(-0.36)	(4.08)	(-1.82)	(0.04)	(1.30)	(3.16)	(0.62)	(-0.41)	(0.05)	(2.04)	(0.89)
Downgrade T	-0.04*	-0.02	-0.04**	0.01	-0.03**	0.02**	-0.01	-0.02**	0.05***	0.04	0.31*	-0.06
	(-1.88)	(-0.53)	(-2.24)	(1.17)	(-3.02)	(2.90)	(-0.78)	(-2.37)	(10.51)	(0.82)	(2.15)	(-0.38)
Downgrade T+1	-0.04	-0.04	0.02	-0.02	-0.01	-0.29***	-0.00	-0.02**	-0.00	0.06	-0.13	-0.11
	(-1.31)	(-1.07)	(1.13)	(-1.13)	(-1.08)	(-41.20)	(-0.34)	(-2.52)	(-0.76)	(1.64)	(-1.54)	(-0.67)
Downgrade T+2	0.01	-0.01	-0.04*	-0.01	0.01	0.08*	0.00	0.02	0.01	0.02	-0.02	-0.03
	(0.72)	(-0.48)	(-2.15)	(-0.28)	(0.91)	(2.02)	(0.30)	(1.46)	(0.79)	(0.50)	(-0.45)	(-0.23)
Debt to GDP	0.02	0.02	0.01	-0.03	-0.03	-0.03*	0.01	0.01	0.01	0.28**	0.26**	0.29**
	(0.50)	(0.49)	(0.42)	(-1.78)	(-1.73)	(-2.17)	(0.70)	(0.88)	(0.79)	(2.78)	(2.60)	(2.98)
Budget Balance	0.04	0.05	0.05	-0.01	0.01	0.01	-0.10**	-0.12**	-0.11**	-0.65	-0.65	-0.73
	(0.19)	(0.24)	(0.20)	(-0.21)	(0.10)	(0.26)	(-2.23)	(-2.26)	(-2.29)	(-0.86)	(-0.89)	(-0.98)
GDP Growth Trend	0.05	0.06	0.09	-0.04	-0.05	-0.04	0.21***	0.18***	0.20***	1.92**	2.12**	1.83**
	(0.28)	(0.33)	(0.43)	(-0.39)	(-0.47)	(-0.36)	(4.26)	(3.28)	(3.45)	(2.77)	(2.98)	(2.36)
Political Risk	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00
	(-0.11)	(-0.08)	(-0.14)	(-0.55)	(-0.46)	(-0.73)	(1.18)	(1.19)	(1.16)	(-0.83)	(-0.87)	(-0.76)
Risk Aversion Index	-0.04	-0.04	-0.04	-0.05	-0.05	-0.05	-0.03	-0.03	-0.03	0.01	-0.01	0.02
	(-1.18)	(-1.22)	(-1.23)	(-1.12)	(-1.12)	(-1.12)	(-1.48)	(-1.48)	(-1.48)	(0.23)	(-0.16)	(0.45)
Negative Outlook	-0.01	-0.00	-0.01	-0.00	0.01	-0.00	0.00	0.01	0.01	0.38	0.30	0.38
	(-0.75)	(-0.09)	(-0.37)	(-0.20)	(0.82)	(-0.18)	(0.11)	(0.60)	(0.28)	(1.71)	(1.66)	(1.72)
R-squared	0.17	0.17	0.17	0.12	0.12	0.12	0.12	0.13	0.12	0.22	0.23	0.22
Nb of Observations	1319	1319	1319	1337	1337	1337	1129	1129	1129	1467	1467	1467
Nb of Countries	12	12	12	12	12	12	11	11	11	12	12	12
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors clustered on country basis. *t* statistics in parentheses. * p<.10, ** p<.05, *** p<.01

Table 24

Table 24A Results Summary for Upgrades

	Foreign Private	Foreign Official	Banks	Pension & Ins.	Inv. Fund	Sov. Yield
Entire Sample						
Standard Upgrade	T-2					
Preceded by Outlook	T+1			T-1	T-2	
Unpreceded by Outlook		T-2, T-1, T ,T-1, T-2			T-2,T-1,T+1	
Peripheral Eurozone						
Upgrade by Rating Agency	Cross, FI, MO				S&P,FI	S&P, Mo
Serial Upgrade	2nd, 3rd		2nd, 3rd		1st, 2nd	1st, 2nd
Multi-notch Upgrade				1-notch		
Emerging Economies						
Upgrade by Rating Agency				MO		S&P
Serial Upgrade	2nd,3rd		3rd	3rd		2nd,3rd
Multi-notch Upgrade	2N			2N, 3N		1N, 3N

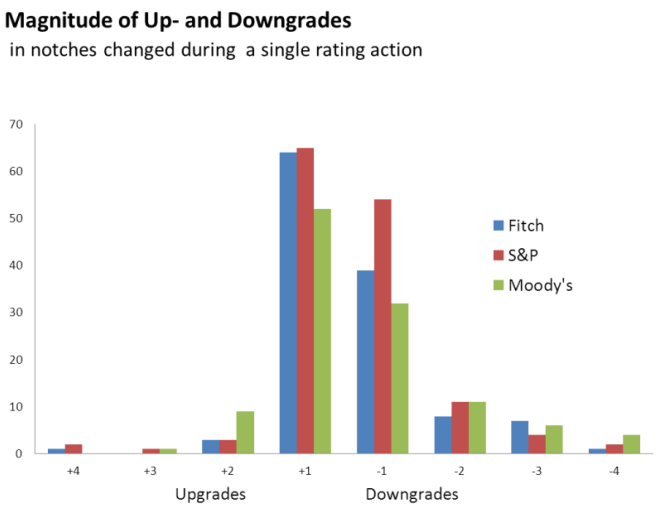
Note: T refers to months before or after the downgrade. Serial Downgrades are calculated over 24 month horizon. Multi-notch changes are marked 1N for one-

Table 24B Results Summary for Downgrades

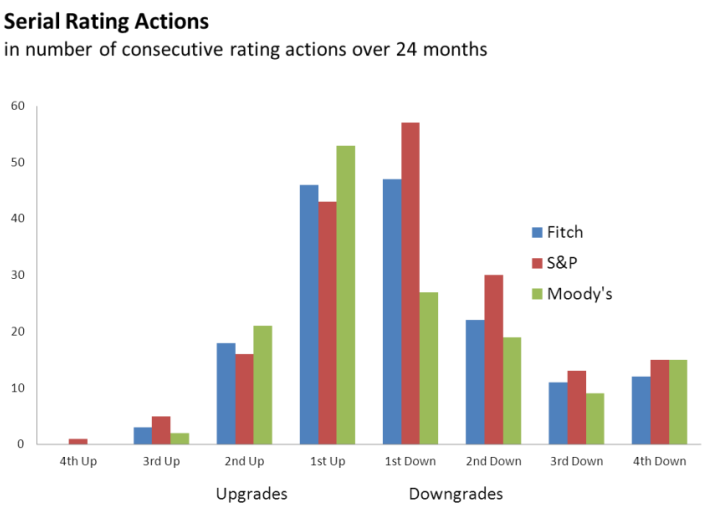
	Foreign Private	Foreign Official	Banks	Pension & Ins.	Inv. Fund	Sov. Yield
Entire Sample						T-2, T
Standard Downgrade				T-1, T		
Preceded by Outlook		T	T-1,T+1	T	T	
Unpreceded by Outlook						T-2, T+2
Safe Havens						
Standard Downgrade	T+2	T+1			T	T+2
Peripheral Eurozone						
Downgrade by Rating Agency	Cross, S&P, MO	S&P, MO				Cross, S&P, FI, MO
Serial Downgrade	3rd	1st, 2nd, 3rd	3rd			3rd
Multi-notch Downgrade	1N, 2N, 3N	1N	3N			2N
Emerging Economies						
Downgrade by Rating Agency	FI		Cross, FI	Cross, FI, MO		FI
Serial Downgrade	3rd		1st, 3rd			3rd
Multi-notch Downgrade	1N, 3N		1N, 2N, 3N	1N, 2N, 3N		2N

Note: T refers to months before or after the downgrade. Serial Downgrades are calculated over 24 month horizon. Multi-notch changes are marked 1N for one-

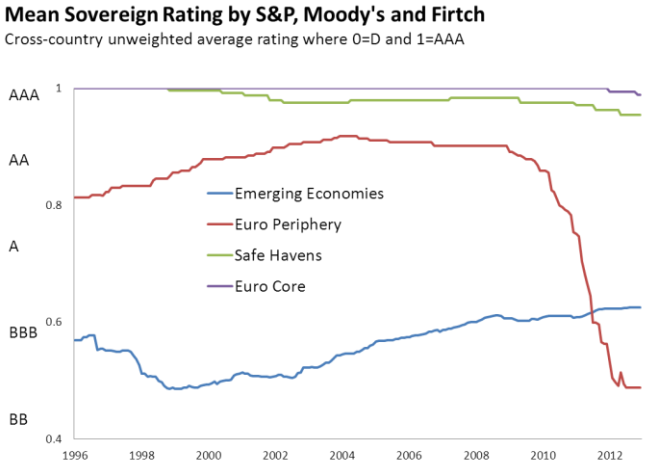
Graph 1



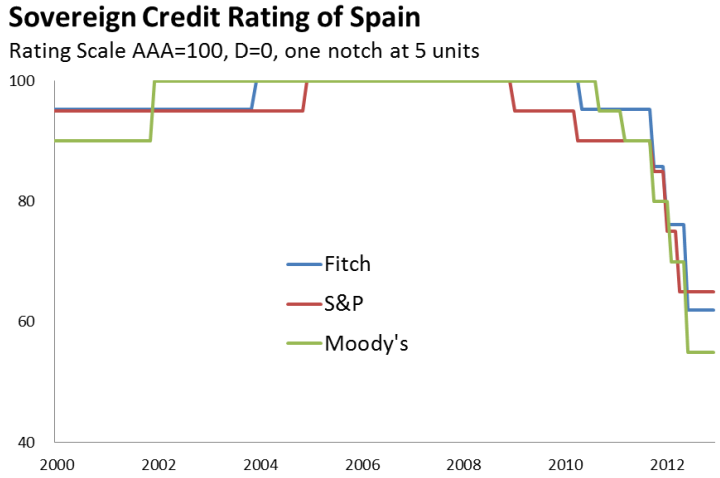
Graph 2



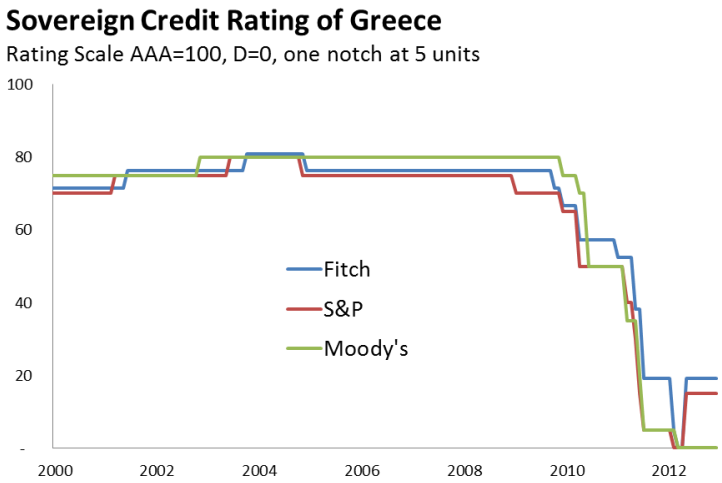
Graph 3



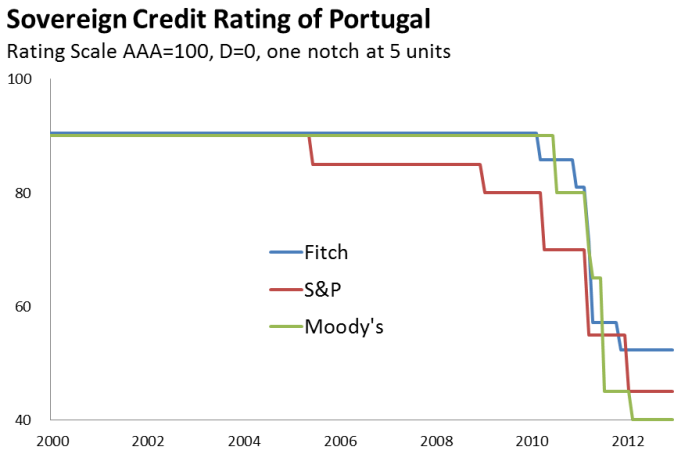
Graph 4



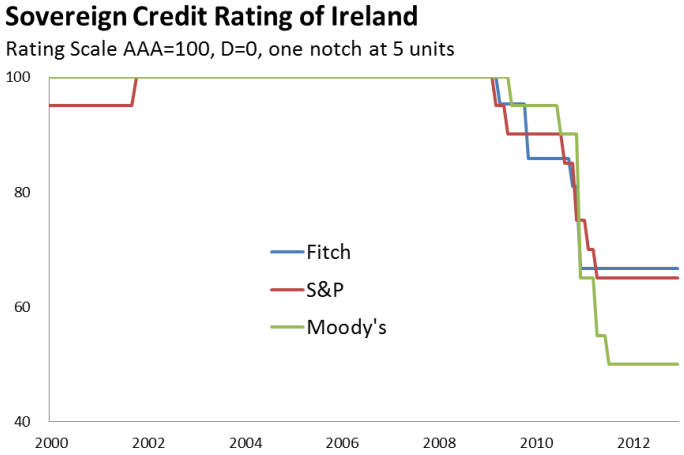
Graph 5



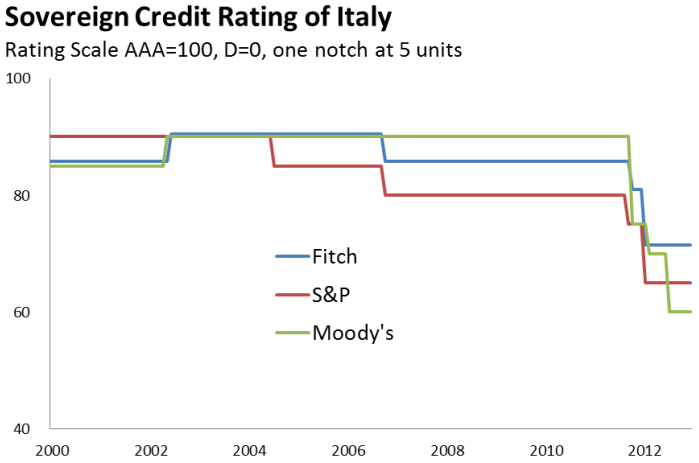
Graph 6



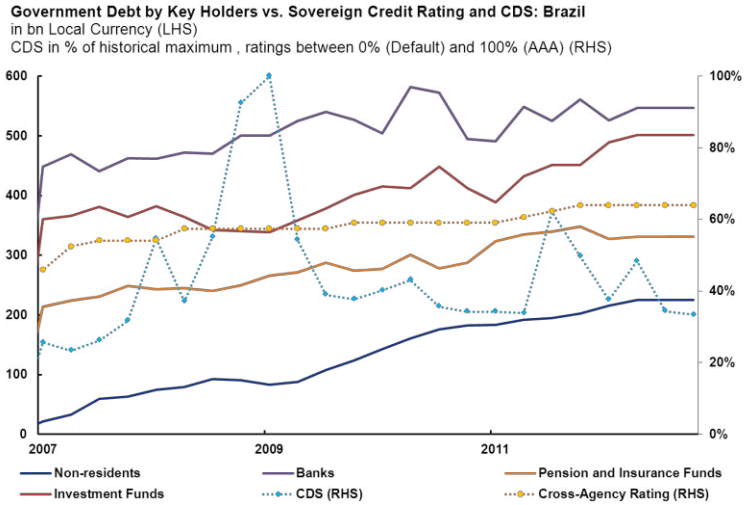
Graph 7



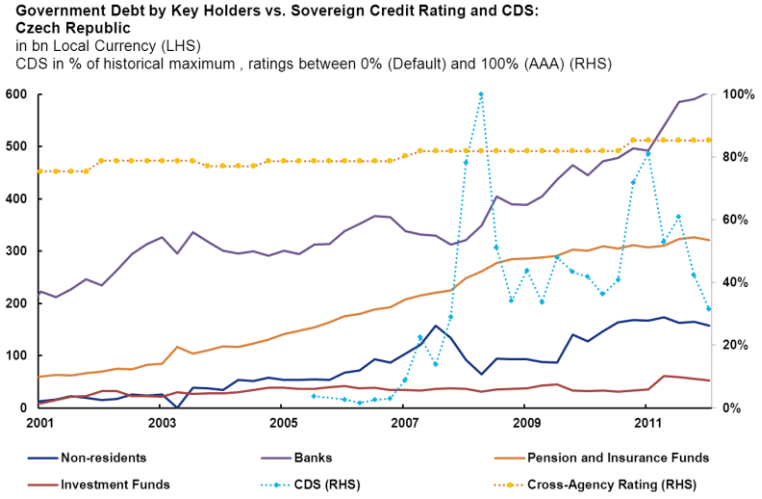
Graph 8



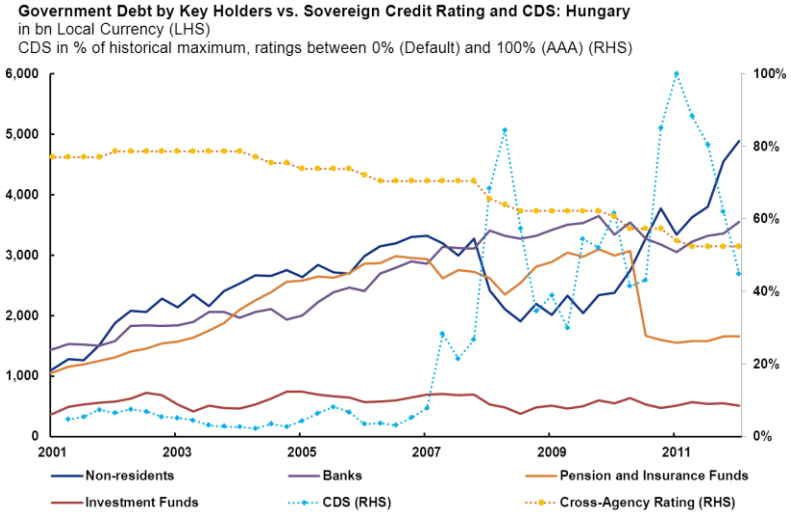
Graph 9



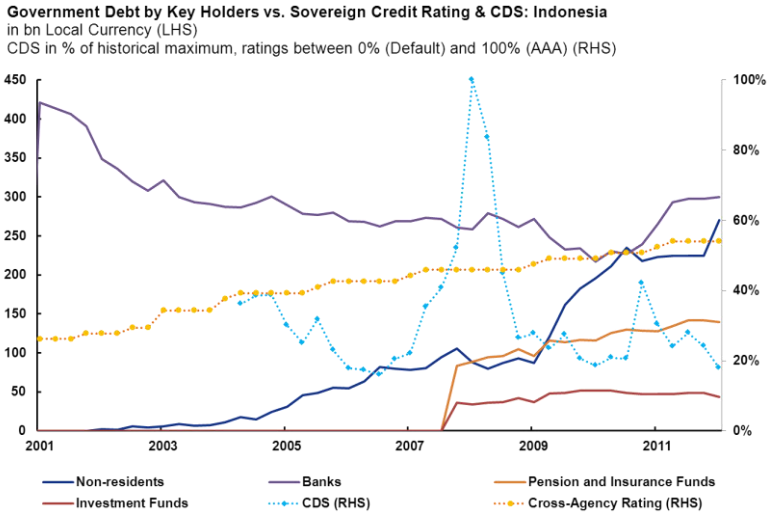
Graph 10



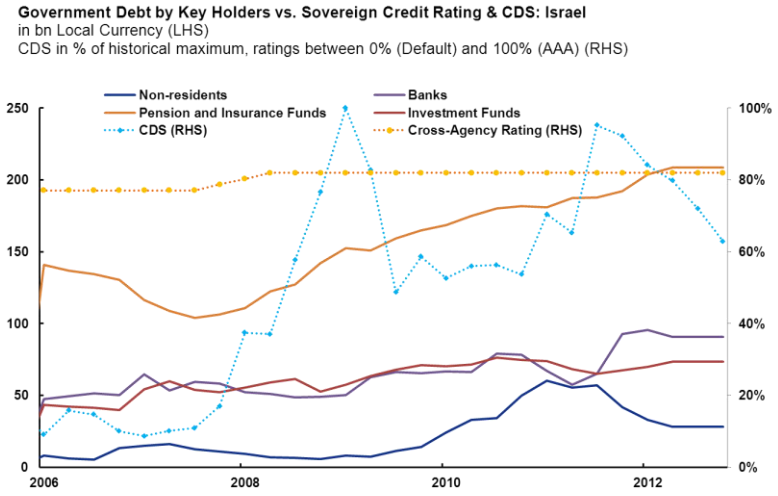
Graph 11



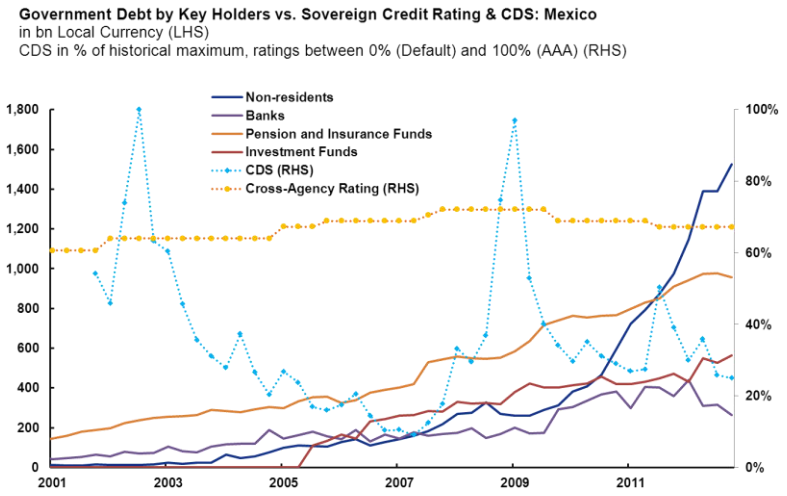
Graph 12



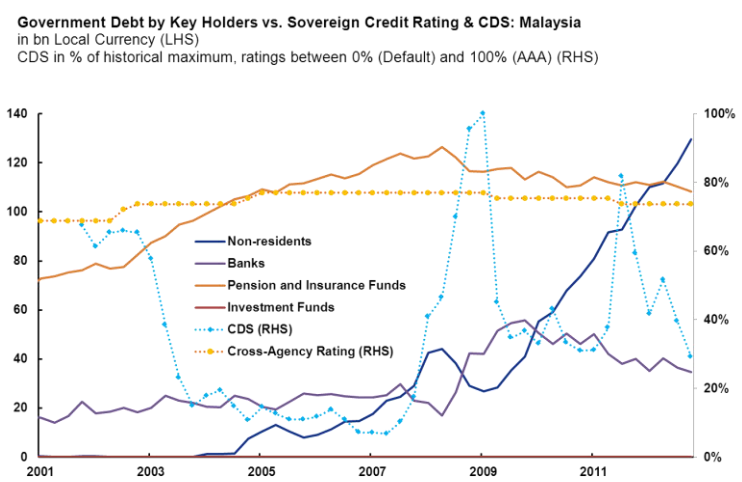
Graph 13



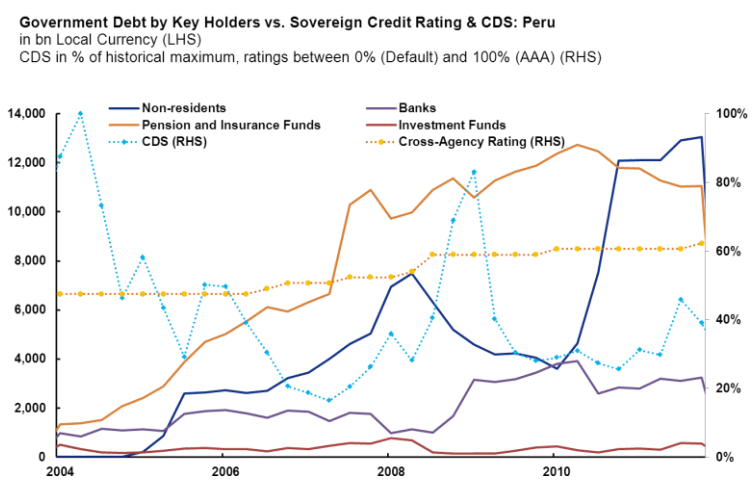
Graph 14



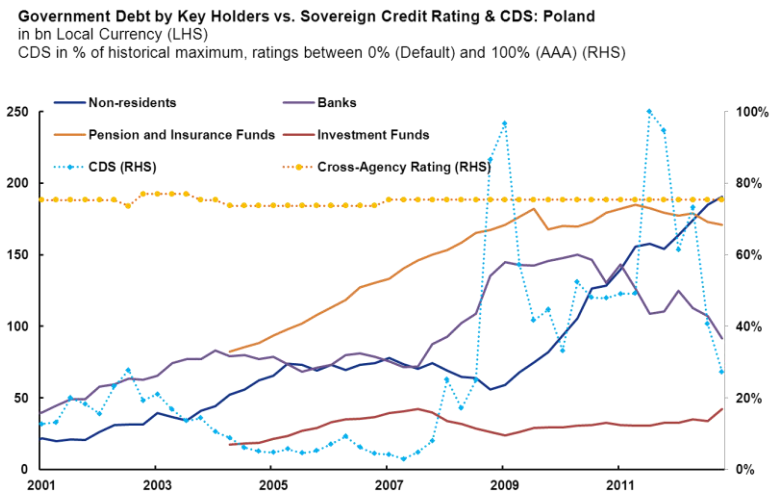
Graph 15



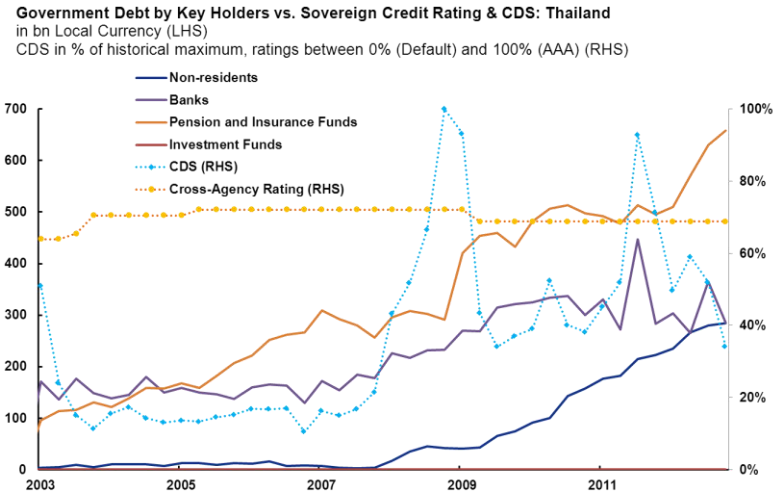
Graph 16



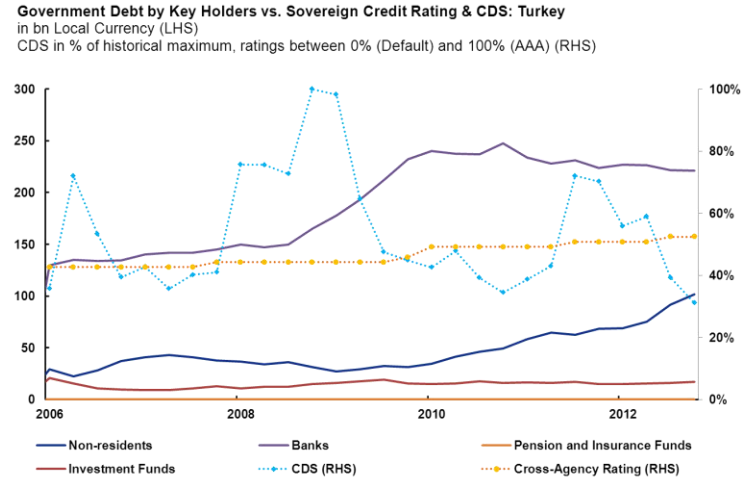
Graph 17



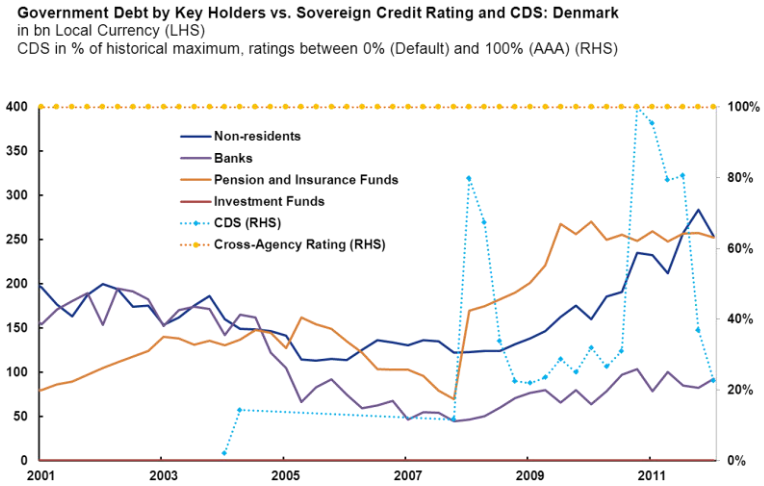
Graph 18



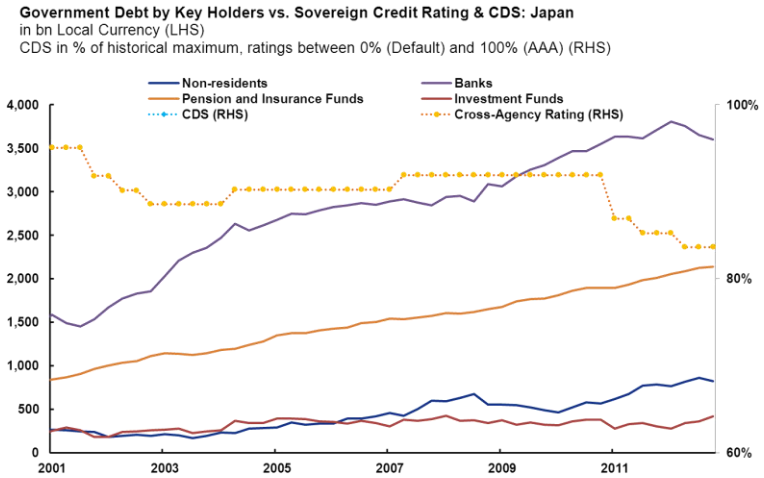
Graph 19



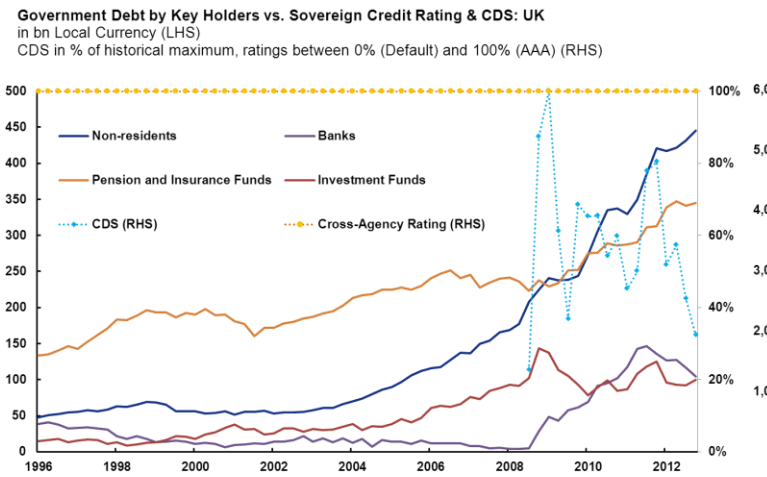
Graph 20



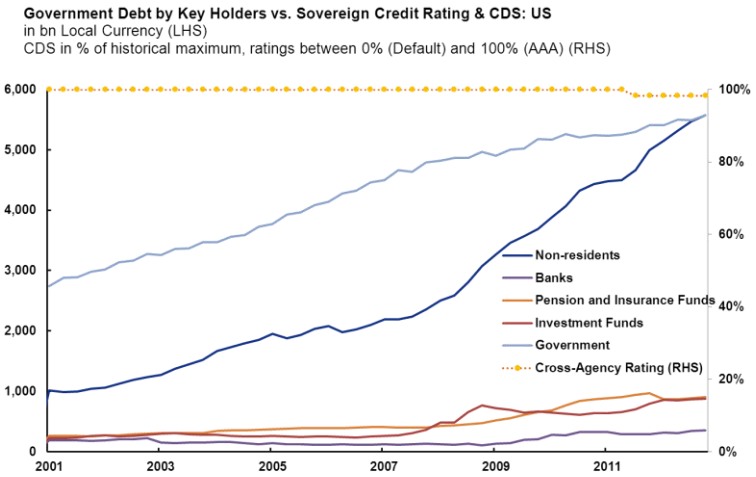
Graph 21



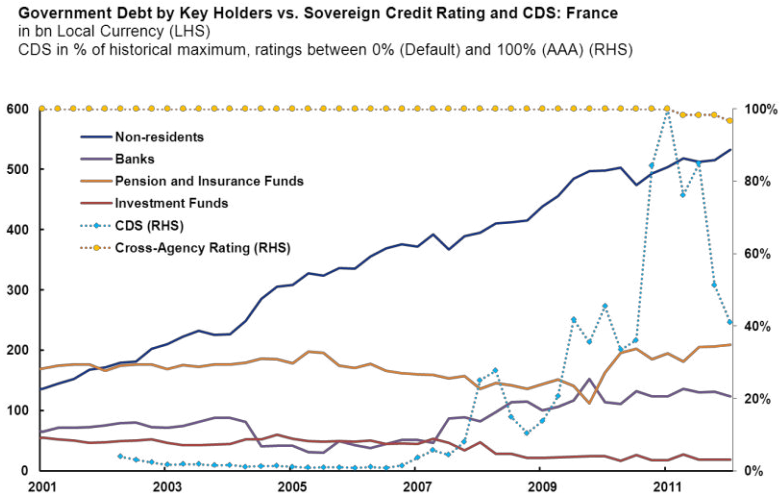
Graph 22



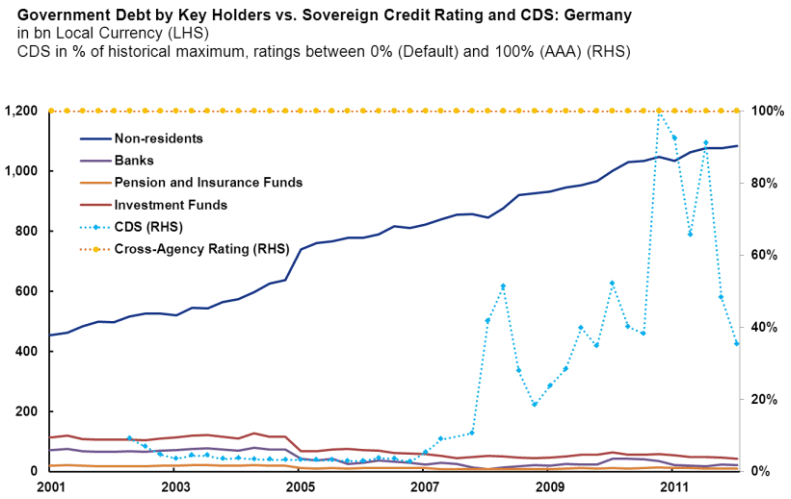
Graph 23



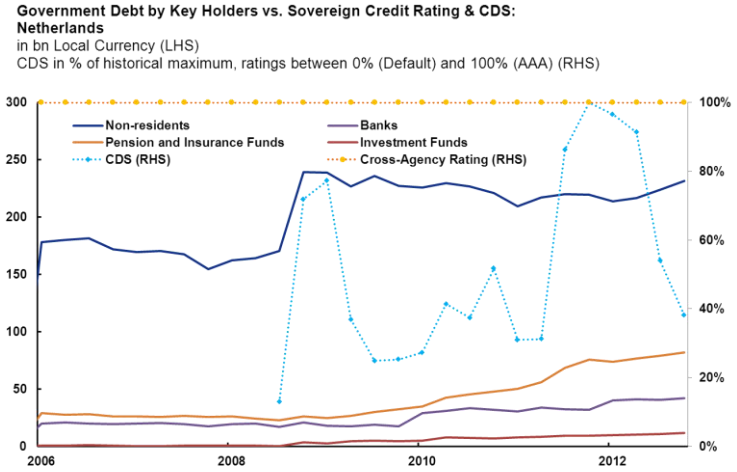
Graph 24



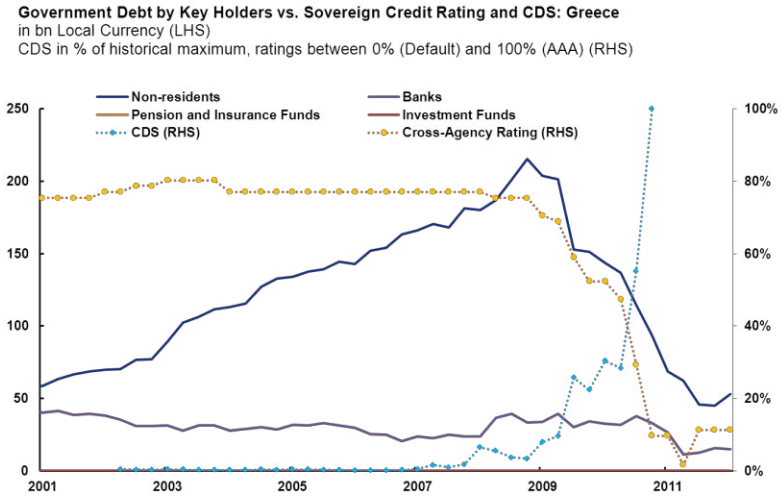
Graph 25



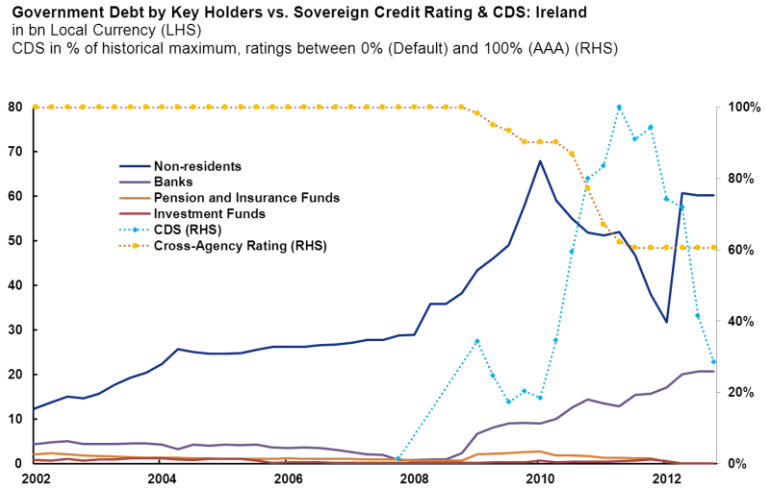
Graph 26



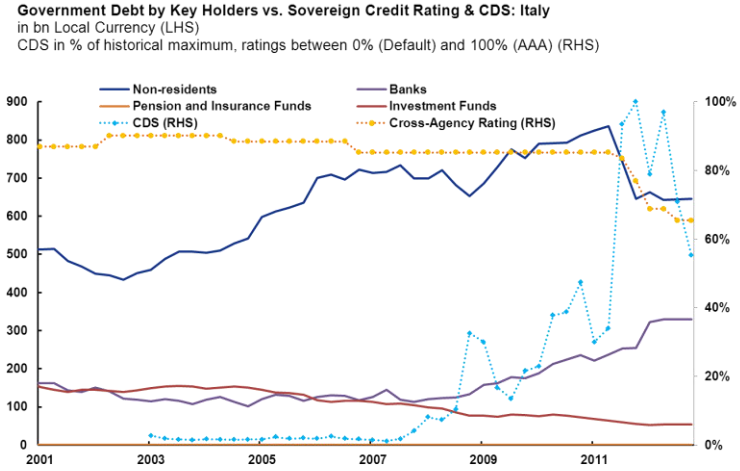
Graph 27



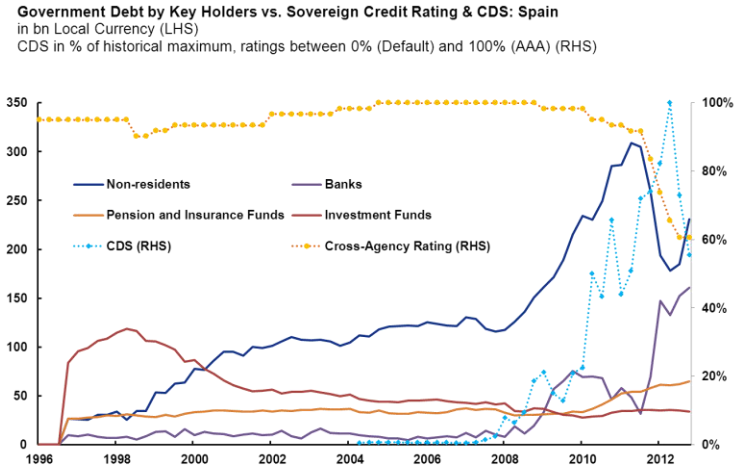
Graph 28



Graph 29



Graph 30



Appendix

Table 25

Table: Data Sources and Frequency

Region	Country	Data	Frequency	Data Availability	Distinction for Maturity	Form and Valuation	Coverage	Source
Eurozone Core	France	Abs	Monthly	10/1999 - 06/2013	Only government and central bank bonds	Stocks, N/A	N/A	Agence France Tresor. Monthly Bulletin.
	Germany	Abs	Quarterly	12/1999 - 03/2013	Bills and bonds	Stocks, nominal value	Central Government	I. Courtesy of Bundesbank. Department of "Bankenstatistik und andere Finanzstatistiken" II. Alternative, less detailed dataset with longer history of general government debt: Bundesbank. Statistics. Time series. Public finances. Sovereign debt developments. Creditors. III. Bundesbank Depot Statistik - Verschuldung des Bundes for data starting before 2005
	Netherlands	Abs	Quarterly	12/1999 - 03/2012	Bills and bonds	Stocks, nominal value	Central Government	Courtesy of Balance of Payments Department of the Dutch National Bank
Eurozone Periphery	Greece	Abs	Quarterly	12/1997 - 03/2013	Bills and bonds	Stocks, nominal value	Central Government	Bank of Greece. Statistics. Financial Accounts. Central Government. Quarterly Data
	Ireland	Abs	Monthly	09/2001 - 12/2012	Only government and central bank bonds	Stocks, nominal value	Central Government	Central Bank of Ireland. Securities Statistics
	Italy	Abs	Monthly	01/1997 - 02/2013	1. Bills, 2. Bonds, 3. Zero Coupon Bonds, 4. Variable rate treasury credit certificates	Stocks, market value	Central Government	Base informative pubblica. Supplements to the statistical bulletin. I. The Public Finances. Borrowing Requirement and Debt. General Government Debt. By residual maturity II. The Financial Market. Securities: stocks by groups of investors. Table TDEE0060.
	Portugal	Abs	Quarterly	12/2007 - 04/2012	Bills and bonds	Stocks, market value	Central Government	Bank of Portugal. Statistical Bulletin. Statistics. Statistical publications. Statistical Bulletin. Publications Document List. Chapter K
	Spain	Abs	Monthly	12/1996 - 12/2012	Bills and bonds	Stocks, nominal value	N/A	1) Banco de Espana Statistics. Boletín Estadístico. Chapter 22: Mercados secundarios de valores 2) Tesoro Publico. Boletín de Estadisticas.
Developed Non-euro	Denmark	Abs	Monthly	12/1999 - 06/2013	Bills and bonds	Stocks, nominal value	Federal Government	Central Bank. Securities Statistics. DNVPDKS: VP-registered securities by issuer and investors sector.
	Israel	Abs	Monthly	01/2006 - 12/2012	Bills and bonds	Stocks, nominal value	Central Government	Bank of Israel. Publications. Annual Reports. Bank of Israel Annual Report - by year
	Japan	Abs	Quarterly	12/1997 - 12/2012	Bills and bonds	Stocks, market value	Central Government	Bank of Japan. Time Series Data Search. Flow of Funds. Data Selection By List of Series. Flow of Funds. Financial Assets and Liabilities
	UK	Abs	Quarterly	03/1987 - 03/2013	Bills and bonds	No information provided	Tradable Government Securities	1) UK Debt Management Office. Gilt Market Data. Data on average maturity and duration available as "gross" debt and "net" debt from 2004 and 2005 respectively. 2) Office for National Statistics. Courtesy.
	US	Abs	Quarterly	03/2001 - 12/2012	Total marketable debt	Stocks, nominal value	Central Government	I. The Bureau of the United States Department of Treasury. Treasury Bulletin. Ownership of Federal Securities II. Federal Reserve Bank of St. Louis. Fred Economic Data. Money, Banking, & Finance. Monetary Data. Securities, Loans, & Other Assets & Liabilities Held by Fed . U.S. Treasury securities held by the Federal Reserve: All Maturities

Table 26

Table: Data Sources and Frequency

Region	Country	Data	Frequency	Data Availability	Distinction for Maturity	Form and Valuation	Coverage	Source
Emerging Asia	Indonesia	Abs	Monthly	05/1999 - 03/2013	Total marketable debt	Stocks, market value	Central Government	1. Bank of Indonesia. Statistics. Indonesian Financial Statistics. Government Finance Sector. Outstanding of Government Securities 2. Directorate General of Debt Management. Statistics. Ownership of Tradeable Government Securities
	Malaysia	Abs	Quarterly	03/1996 - 03/2013	Bills and bonds	N/A	N/A	Central Bank of Malaysia. Publications & Research Paper. Periodicals. Monthly Statistical Bulletin. Table 3.1.5 Federal Government Domestic Debt: Classification by Holder
	Thailand	Abs	Monthly	01/2003 - 04/2013	Bills and bonds	Stocks, nominal value	Federal Government	I. Bank of Thailand. Statistics. Financial Markets. Debt Securities - series from 2009 onwards II. Datastream based on Bank of Thailand
Emerging Europe	Czech Republic	Abs	Monthly	12/1996 - 03/2013	1. Bills and bonds 2. By maturity: T-bills to 50y bonds	Stocks, nominal value	Central Government	Ministry of Finance. State Debt. Debt Statistics. Treasury Securities by Type of Holder.
	Hungary	Abs	Quarterly	12/1997 - 12/2012	Bills and bonds	Stocks, N/A	Federal Government	I. Government Debt Management Agency. Publication, Statistics. Statistics. Ownership structure of government securities II. Hungarian Central Bank. Statistics. Statistical Data and Information. Statistical Time Series. Table XIII: Securities Data on securities issued by Hungarian residents with breakdown by issuer and holding sectors
	Poland	Abs	Monthly	01/1996 - 06/2013	1. Bills and bonds 2. By instrument, i.e. year of maturity	Stocks, market value	Central Government	Ministry of Finance. Public Debt. Publications. 1) Investors. Secondary Market. Nominal T-bonds and T-bills outstanding 2) State Treasury Debt
	Turkey	Abs	Monthly	01/2006 - 05/2013	Total marketable debt	Stocks, nominal value	Central Government	Republic of Turkey Prime Ministry Undersecretariat of Treasury. Statistics. Public Finance. Central Government Domestic Debt Statistics. Composition of Domestic Debt Stock by Holders.
Emerging Latin America	Brazil	Abs	Monthly	01/2007 - 05/2013	Total marketable debt	Stocks, nominal value	Central Government	I. Tesouro Nacional. Public Debt. Federal Public Debt Monthly Report.
	Mexico	Abs	Monthly	01/1999 - 06/2013	Bills and bonds	Stocks, nominal value	Central Government	1) Financial system. Financial markets. Debt outstanding. 2) Public Finances. Average Maturity of Government Securities.
	Peru	Abs	Monthly	11/2003 - 11/2011	By instrument, i.e. year of maturity	Stocks, nominal value	Central Government	Courtesy of Dirección General de Endeudamiento y Tesoro Público de la República del Perú

Table 27

Table : Data Sources for Explanatory Variables

Indicator	Frequency	Source
Debt to GDP	Annual	IMF WEO
Primary Budget Balance	Annual	IMF WEO
Citigroup Global Macro Risk Aversion Indicator	Monthly	Citigroup
Political Risk	Monthly	Economist Intelligence Unit via Bloomberg
S&P Rating and Outlook	Daily	Courtoisy of S&P Ratings
Moody's Rating and Outlook	Daily	Courtoisy of Moody's
Fitch Rating and Outlook	Daily	Courtoisy of Fitch

Table 28

Table: Panel Unit Root Test

	Non-resident		Non-resident		Domestic		Pension and Ins		Investment		Sovereign	
Statistic	Level	1st Dif	Level	1st Dif	Level	1st Dif	Level	1st Dif	Level	1st Dif	Level	1st Dif
Inverse chi-squared	103.3	1429.4	19.1	885.7	75.8	1510.5	92.7	1269.7	82.8	1205.2	36.5	1500.5
Inverse normal	-2.6	-35.7	2.5	-28.3	0.0	-37.0	-1.3	-33.8	-2.7	-33.1	1.4	-36.7
Inverse logit	-3.8	-84.4	2.9	-68.2	-0.5	-89.2	-2.3	-80.7	-3.4	-78.7	1.3	-84.8
Modified inv. chi-	6.3	147.7	-1.0	119.2	3.4	156.3	6.3	141.3	5.5	137.8	-1.2	148.2
P-value												
Inverse chi-squared	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0
Inverse normal	0.0	0.0	1.0	0.0	0.5	0.0	0.1	0.0	0.0	0.0	0.9	0.0
Inverse logit	0.0	0.0	1.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.9	0.0
Modified inv. chi-	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0

Note : Fisher-type Test using Phillips-Perron method, with time trend and demeaning

Table 29

Table: Fixed vs. Random Effects Test

	Non-resident Private	Non-resident Official	Domestic Banks	Pension and Ins Funds	Investment Funds	Sovereign Yield
Chi2 Stats	1.63*	5.74*	1.02*	5.73*	1.94*	9.27*
Probability	97%	57%	99%	57%	96%	23%

H0: Difference in coefficients not systematic. All variables in first difference. *Test results inconsistent

Table 30

Table: Fixed Time Effects Test

	Non-resident Private	Non-resident Official	Domestic Banks	Pension and Ins Funds	Investment Funds	Sovereign Yield
Chi2 Stats	213.3	423.7	171.6	177.4	160.0	401.3
Probability	0%	0%	28%	19%	52%	0%

Note: Linear parameter tests for joint nullity of residuals.

Table 31

Table: Modified Wald test for groupwise heteroskedasticity in fixed effect regression model

	Non-resident Private	Non-resident Official	Domestic Banks	Pension and Ins Funds	Investment Funds	Sovereign Yield
Chi2 Stats	35566	7507	1600000	38239	59210	57728
Probability	0%	0%	0%	0%	0%	0%

Note: HO : sigma(i)^2 = sigma^2, i.e. series are homoscedastic

Table 32

Table: Presence of Serial Correlation

	Non-resident Private	Non-resident Official	Domestic Banks	Pension and Ins Funds	Investment Funds	Sovereign Yield
F (1, 21) Stats	3.504	16.65	9.15	1.156	4.358	9.567
Probability	8%	0%	1%	30%	5%	1%

Note: H0: no first-order autocorrelation

Table 33

Table: Pesaran's test of cross sectional independence

	Non-resident Private	Non-resident Official	Domestic Banks	Pension and Ins Funds	Investment Funds	Sovereign Yield
Chi2 Stats	4.807	24.123	2.713	3.358	1.813	42.47
Probability	0%	0%	1%	0%	7%	0%

Note:

ARTICLE 3

Do local or foreign currency bonds react differently to shocks local risk factors?[18]

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[18] We are grateful for comments to Aitor Erce (ESM), Alexandre Jeannaret (University of Montreal) and Alexander Guembel (University of Toulouse)

Do local or foreign currency bonds react differently to local risk factors?

Abstract

Using a new dataset composed of individual bonds for 30 developed and emerging countries, this article investigates and contrasts the determinants of foreign and local currency yields.

In emerging economies political risk has significant and positive impact on both LC and FC yields with similar magnitude. Inflation, current account balance and debt to GDP have stronger effects on unhedged LC yields than on FC yields. More importantly, our findings that not only higher foreign participation, but also higher share of LC debt to total debt render valuation of government bonds more prone to local risk factors.

Findings indicate that the spread between FC yield and FX-hedged LC Yield is relatively high for risky countries and it is significantly and positively related to credit ratings and political risk in all countries. Interestingly, both rising inflation and debt to GDP increase the FC hedged-LC spread for emerging economies, but decrease the spread for advanced economies.

Keywords: Sovereign Default, Local Currency Debt, Foreign Currency Debt, International Bonds

JLE Classification: F31, F33, F34, F41, H63

I. Introduction

For many years emerging economies were stigmatized as unreliable borrowers and limited to short-term borrowing in foreign currencies. However, over the last two decades numerous countries successfully developed local currency (LC) bond markets, yet foreign currency (FC) issuance remains an important source of funding for numerous emerging economies. As emerging economies open up their capital accounts and LC government bonds became liquid and tradable, they gained popularity among international investors which exposed the LC bonds and issuing governments to fluctuations in global demand for yield, as it was the case previously with foreign currency bonds. In consequence, understanding the evolution of the debt structure and drivers of LC and FC yields became of outmost importance to investors, treasury agencies and policymakers. Existing empirical literature on currency denomination of government debt was divided into three main flows. First focused on development of LC bond markets and original sin, for instance Eichengreen and Hausmann (1999), Mehl and Reynaud (2010), second mechanisms and history of domestic and external defaults, e.g. Reinhart and Rogoff (2011), and third analyzed the determinants of FC bond spreads or LC bond yields, e.g. Eichengreen and Mody (1999). Newest research by Peiris (2010) and Gadanecz and al. (2014) added the link between foreign participation in LC yields. Finally, Du and Schreger (2013) investigated the impact of global risk factors on LC and FC yields and the determinants of corresponding sovereign defaults.

This article combines these schools by analysing how fundamental and political indicators related to sovereign risk determine the LC and FC yields and the FX-hedged difference between them. The novelty of our approach consists in comparing local currency bonds with foreign currency bonds using a broad dataset of individual bonds that covering both developed and emerging countries. On top of that, we use data for the currency structure of government debt and foreign participation to analyse how the reactivity of LC yields evolves under different structures.

To provide a complete picture we investigate separately the unhedged LC yields, FC yields and the spread between FX-hedged LC yields and FC yields. Empirical findings lead us to conclusion that in general LC yields react more to local risk factors than FC yields and the reactivity increases when the share of LC debt to total debt or foreign participation in LC debt increase. Three major patterns emerge with regard to this conclusion.

First, basic statistical patterns help explain why government continue to issue in foreign currencies. In fact, the spread between LC and FC yields in high rating advanced economies has been relatively low, while in emerging economies the FC yield remains lower by 1% to 3% than the unhedged LC yield. Moreover, the duration of FC bonds issued by emerging economies has almost doubled between 1998 and 2013 and remains considerably higher than duration of local currency bonds. We compare the econometric determinants of the LC and FC yields and demonstrate that **in emerging economies political risk has significant and similar impact on LC and FC yields, whereas inflation, current account balance and debt to GDP are significant and have stronger effects on unhedged LC yields than on FC yields.**

Second, empirical results suggest that sovereign risk on FC debt might be perceived differently from sovereign risk of LC debt causing the deviations from covered interest parity. The spread between FC yields and FX-hedged LC yields is marginally low in developed countries and investment grade-rated emerging economies, yet it becomes high in riskier developed and emerging countries such as Greece, Spain, Russia or Turkey. **Econometric results for all countries indicate that the spread between FC yield and FX-hedged LC yield is significantly and positively related to credit ratings and political risk. Interestingly, both rising inflation and debt to GDP significantly increase the FC hedged-LC spread for emerging economies, but decrease the spread for advanced economies.**

Third, in emerging countries with high share of LC debt and high share of foreign participation the estimated coefficients for political risk, inflation, credit rating and current account are significant and considerably stronger than for the full sample. Interestingly, under high foreign participation and high share of LC debt, the coefficients are also stronger for LC yield than for FC yield. **These findings suggest that not only higher foreign participation, but also more developed local currency bond markets, i.e. higher share of LC debt to total debt, render valuation of government bonds more prone to local risk factors.**

The article begins motivation and literature review, then it moves to data and estimation methodology and in the final section we present the descriptive statistics and econometric results.

II. Motivation

Currency and sovereign crisis that wreaked havoc in emerging economies throughout the 1970s to 1990s stigmatized governments of those countries as unreliable borrowers. Underlying economic uncertainty, low credibility of monetary institutions and high inflation resulted in limited confidence in local currency (LC) securities and many sovereign borrowers were constrained to borrow in foreign currencies (FC), mainly dollar, sterling or mark. However, over the last two decades developing economies switched to the path of stable growth, reduced external vulnerability, financial liberalization and improved statistical coverage. As a result, exchange rates of several emerging economies stabilized as well as local equity and bond markets.

As a result, the global market for government debt, once dominated by bonds of advanced countries, began to embrace emerging market bonds denominated in local currencies. Graph **Błąd! Nie można odnaleźć źródła odwołania.** demonstrates that the share of foreign debt issued by developed economies historically oscillated around 5 per cent, emerging economies reduced their dependence on foreign funding from over 50 per cent in 1993 to less than 20 per cent in 2003 and have maintained this level since. As of 2013 total outstanding foreign currency emerging government debt equalled USD 1700bn, or 5 per cent of globally outstanding sovereign debt. It is noteworthy that governments of advanced countries have been issuing more foreign-currency debt than emerging economies, as indicated by Graph **Błąd! Nie można odnaleźć źródła odwołania.**.

In a nutshell, holding LC bonds, as compared to FC bonds, exposes the investor to three serious risks. First, in case of default, the creditor is likely to face losses not only on bond prices due to the haircut, but also to lose money on currency depreciation that usually comes along. Should the country experience an inflationary shock or capital outflows, than the currency is likely to depreciate lowering the return on the initial investment. Second, in most developing countries holding local currency instruments implies serious liquidity risk for not only on currency hedging instruments, sovereign CDS, but also on LC bonds themselves. Third, lack of enforcement in international law holding LC debt may be risky in case of default, as the issuing government may easily amend the local law and discriminate between local and foreign bondholders. Fourth, borrowing government's willingness to pay may fall if the majority of debt is held by foreign investors and the government prefers to shift the burden on foreign investors to protect the wealth of domestic agents. Although, FC bonds do not expose the investor to these

risks, they might eventually be riskier since they are by definition held predominately by foreign investors and a government could decide to default on them in the first place.

Foreign-currency bond yields are traditionally benchmarked against risk-free government paper in corresponding currency, i.e. US Treasuries for USD-denominated bonds, German Bunds for Euro, Gilts for GBP and JGB for JPY. The resulting sovereign spread for foreign currency bonds remains the uncontested measure of sovereign credit risk. However, lack of equivalent benchmarks for local currency sovereign bonds renders the comparison between countries and maturities a more challenging task.

The bulk of the existing literature is dedicated to valuation and drivers of foreign currency bonds, exchange rates or deviations from covered and uncovered interest rate parity. However, a gap persists with regard to the valuation of bond yields and credit risk of the same issuer in different currencies. The objective of this study is to determine the drivers of local and foreign currency bonds through the prism of political risk, macroeconomic fundamentals such as inflation, global risk aversion and the investor base. The rationale of our approach is explained as follows.

First, political risk reflects the coherence, stability and creditworthiness of the government and established institutions. It is also a proxy for the willingness to repay the debt. Second, macroeconomic fundamentals influence the valuation of bonds and the appreciation or depreciation of currency in the long run. If we consider two countries with identical fundamentals and one of them experiences a macroeconomic shock of high inflation, it would most imply the currency depreciation of the affected country in the long term. Third, global risk aversion influences the capital flows from risky assets to safe assets. Assets held or exposed to re-evaluation by global investors are more likely to react to global shocks than locally held assets. Fourth, the investor base reflects the cost and stability of government financing. If the provision of funds by investors should match the supply of assets, long-term refinancing risk for the government should be limited. In countries where bonds are held mainly by domestic agents bond yields should react less to domestic political and inflation shocks.

III. Literature Overview and Hypothesis Development

In this section we aim to pin down potential channels through which macroeconomics, political and demand-related factors could affect local and foreign currency bond yields.

III.1 Sovereign default, Currency Composition and Inflation

Investors, credit rating analysts and academics tend to disagree on the formal boundaries of sovereign default. In case of the foreign currency debt the situation is more clearcut, as the failure to meet a principal or interest payments on the originally fixed date would automatically trigger the default mechanism specified in the bond legal documentation.

In contrast, debt in domestic currency can be repudiated in several ways. If the government can control the central bank, it may steer the economy into the territory of higher inflation rates, or report inflation rates that are lower than actual figures[19], which would reduce country's debt liability in real terms. To maximize this effect the troubled government could freeze bank deposits, force conversion of deposits in foreign currencies into domestic currency, cap rates on deposits and increase required reserves ratio which would shift the loss to the private sector[20].

In the seminal work on the government's default choices, Eaton and Gersovitz (1981) demonstrate that in absence of international enforcement mechanisms the debtor government is more likely to repay its external debt if it is facing the threat of being permanently excluded from the debt markets. Moreover, Gersovitz (1983) postulates that the government would not default on external debt if domestic financial institutions are dependent on foreign financing, since reduced refinancing capacity would translate into a welfare loss to the domestic private sector. Bulow and Rogoff (1989) further extend this theory showing that legal rights and institutions in the creditor's country, i.e. rule of law and law enforcement in the jurisdiction where debt is issued, determine the willingness to repay its debt. Empirical research confirms discrimination between local and foreign bondholders. Díaz-Cassou and Erce (2010) report that episodes of discrimination between domestic and foreign creditors indeed occurred in the past. Out of ten recent default episodes, four discriminated against foreign creditors, three adopted equal

[19] countries may inflate or falsify statistics on inflation like Argentina in 2011-2013 or amend the indexation clauses. Also the recent case of Kazakh devaluation reminded investors that the central bank credibility and independence can be easily put at stake in certain emerging countries.

[20] In a study on financial repression Brock (1989) showed that inflation and required reserves are positively correlated

treatment and particularly dramatic default episodes, specifically in Argentina, Russia and Ukraine, afforded preferential treatment to foreign creditors.

Interestingly, rating agencies perceive local currency debt as less risky than foreign currency debt. Packer (2003) reports that in 2003 S&P and Fitch were assigning a higher local currency rating to over 50% of sovereigns under coverage. The LC to FC gap was in range 1 to 3 notches and occurred most frequently around BBB rating. The key rationale behind the superiority of LC debt goes back to soverign's capacity to increase taxation of residents to repay LC debt.

Empirical research on the number and severity of government defaults remains relatively scarce. In the seminal article on the history of sovereign defaults, Reinhart and Rogoff (2011) identified 250 cases of external defaults and only 68 documented cases of outright domestic default between 1900 and 2010. However, authors underline that the actual number of domestic defaults related to financial repression and high inflatio, i.e. cases of debt being inflated away, appears to be significantly higher. Interestingly,empirical evidence shows that not only frequency distributions of domestic and external debt differ significantly, but also domestic and external default are vaguely correlated with each other. In fact, even though domestic bankruptcies were less frequent, these episodes were marked by greater fall in output and significantly higher inflation rates that persisted for several years after the occurrence. As a bottomline, these empirical findings give ground to believe that default in domestic defaults are less likely, but more severe, hence rational and knowledgeable investors holding local currency bonds should be at least as cautious as with external default risk.

Recent empirical evidence on debt servicing in developing countries by Kohlscheen (2010) also demonstrates that between 1980 and 2006 sovereign default rates for domestic debt were lower than those for external debt. What is noteworthy is that while external defaults trigger domestic defaults, the reverse causality is less clear.

In contrast to the above mentioned findings, analyzing default events between 1996 and 2012 Jeanneret and Souissi (2014) demonstrate that local and external defaults are equally likely. Their results indicate that currency denomination of sovereign debt explains a large share of probability of default as such. Moreover, a government is more likely to default on its bonds when the country exhibits weaker long-term economic growth and higher inflation. As for the letter effect, inflation raises the default probability on both types of debt but has a greater effect

for local currency debt. Finally, level of indebtedness does not affect the probability of default as such.

Hypothesis 1: unhedged local currency yields and foreign currency yields should respond differently to unfavorable changes in inflation, debt fundamentals and political risk

III.2 Sovereign Credit Ratings and Bond Yields

Investment grade bonds are broadly considered to have significantly lower probability of default than non-investment grade bonds. Hence, investors who pay attention to credit ratings are likely to demand a higher premium for lower rated bonds. Analyzing foreign currency bond spreads in 35 emerging economies between 1997 and 2010 Tejada and Jaramillo (2011) find that the switch from non-investment grade to investment grade reduces the spread by ca. 35%, whereas similar upgrades within investment grade led to a reduction in spreads by 5 to 10% and there was no impact for movements within the speculative grade. Results of empirical studies on interest parity also suggest that credit quality influences bond yields and foreign exchange derivatives. Skinner and Mason (2011) find hat while covered interest rate parity holds for large and small AAA-rated economies, it holds for emerging markets only for a three-month maturity. Covered interest rate parity does not hold for medium to long-term horizons in Brazil, Chile, Russia and South Korea.

Hypothesis 2: Shocks in risk factors have a higher impact on the FCLC spread of non-investment grade bonds than on investment grade bonds.

III.3 Development of local currency bond markets and discrimination

While advanced economies have been able to borrow in local currency bond markets for over half a century, until late 1990s most emerging economies were contrained to borrow either short-term, with floating rates or in foreign currencies. This phenomenon has been outlined by Eichengreen and Hausmann (1999) as the ‘original sin’. Low credibility of local authorities, high inflation rates and economic instability discouraged investors from embracing local currency debt. In the result, emerging economies were raising funds in foreign currency, while local

currency debt was either non-existent, short-duration or inflation-indexed. Mehl and Reynaud (2010) show evidence on composition of government debt in 33 emerging economies over 1994-2006 and demonstrate the share of foreign currency denominated debt is related to fiscal soundness, size of the economy and investor base, and most importantly, rate of inflation. Nevertheless, Hausmann and Panizza (2011) find that over time emerging economies have reduced their dependence on foreign currency funding and reduced their debt levels and external vulnerabilities in general. Authors warn that this effect may be temporary and due to the relatively expensive cost of foreign borrowing.

Broner et al. (2014) analyse the Eurozone debt crisis from the perspective of creditor discrimination and crowding-out. Their empirical and theoretical findings indicate that, in turbulent times, domestic sovereign debt offers a higher expected returns for domestic investors than for foreign investors. This happens because the probability of default on domestic debt is lower than for foreign investors. Moreover, from domestic investors' point of view, domestic sovereign debt offers greater returns than domestic private debt due to financial frictions.

Hypothesis 3a: countries with more developed local currency bond markets, i.e. where the share of local currency debt to total debt is high, are more immune to risk factors. As a result, local currency bonds should react less to political and inflation shocks than foreign currency bonds. Inversely, foreign investors may fear to be discriminated if the share of foreign currency debt is too high.

III.4 Empirical studies on foreign participation in local currency bonds

In a review of existing work on sovereign debt and default Tomz and Wright (2013) find that there is limited empirical literature why governments honour domestic debt depending on the currency of borrowing. They also find that the rise in the foreign participation in domestic debt made incentives for default on domestic debt foreign debt.

Reinhart and Rogoff (2011) point towards the 'missed link' between local and foreign currency debt, namely that the incentives of domestic and external default should converge at high participation of foreign investors in domestic debt, as high inflation would scare foreign

investors off. Now, if we consider the progress in central bank independence and external prowess that emerging economies have made in the recent decade, government's capacity to inflate should be limited and hence credit risk on external and internal debt should be similar.

Peiris (2010) analyzes the relationship between local currency yields and foreign participation in 10 emerging markets between 2000 and 2009. His results show that greater foreign participation in the domestic government bond market tends to significantly reduce long-term government yields. Moreover, greater foreign participation does not necessarily result in increased volatility in bond yields in emerging markets and could even dampen volatility in certain situatons. Gadanecz, Miyajima, and Shu (2014) analyze the determinants of LC bond yields at 5-year maturity between 2012 and 2014 in 12 EM countries and find that foreign participation in LC bond markets tends to lower bond yields. For each additional percentage point increase in foreign nonbank holdings, local currency bond yields fall by 8–9 basis points. In turn, Ebeke and Yinqiu (2014) analyze at the period Q2 2009 to Q1 2013 in a similar panel of countries and find that foreign holdings have reduced bond yields but increased yield volatility in the post-Lehman period.

Hypothesis 3b: at high levels of foreign participation in local currency bonds, determinants of local currency yields should resemble those of foreign currency yields

III.5 Factors determining spreads on foreign currency bonds

Academic literature documents relatively well that foreign currency bond yields are prone to changes in the US interest rates and shocks in global risk aversion.

Eichengreen and Mody (1999) look at FC issuance choices of EM debtors between 1991 and 1996 and find that an increase in issuance is more likely in times of an economic slowdown, i.e. when US interest rates are lower and investors are looking for higher yields in foreign markets, even though issuer's macroeconomic conditions are weaker, i.e. reserves are low and budget deficits are larger.

Kodres, Hartelius and Kashiwase (2008) look at FC spreads between 1991 and 2007 and find that the gradual spread compression that took place over this period was due to the

improvement in country fundamentals on one hand and volatility of expectations of US yields on the other.

Arora and Cerisola (2001) find that while country-specific fundamentals are important in explaining fluctuations in country risk, the stance and predictability of U.S. monetary policy are also important for stabilizing capital flows and capital market conditions in emerging markets.

Bellas Dimitri, Papaioannou, Michael G, and Petrova, Iva (2010) analyse FC EM bond spreads through the prism of risk aversion between 1997 and 2009 and state that while debt to GDP and current account are key determinants of sovereign spreads in the long term, in the short the term spread level becomes strongly correlated to the financial stress index.

Using panel vector autoregression (PVAR) Akıncı (2013) the impact of global financial conditions on FC country spreads and macroeconomic fluctuations in six EM countries between 1994 and 2011. His findings reveal that while shocks in the risk free rate have a limited and short-lived effect, global financial shocks explain about 20% of movements both in the country spread and in the aggregate activity. Last but not least he finds that country spread shocks explain about 15 percent of the business cycles in emerging economies.

Uribe and Yue (2006) apply panel VAR methodology to disentangle the risk-free rate, country spreads and macroeconomic fundamentals for six EM countries between 1994 and 2005. Their findings suggest that US interest rate and country spread shocks explain respectively 20% and 12% of movements in aggregate activity in emerging economies, while the subsequent feedback from fundamentals to country spreads significantly exacerbates business-cycle fluctuations. Interestingly, in response to an increase in US interest rates, country spreads first fall and then display a large, delayed overshooting.

Using GARCH models Thuraisamy, Gannon, and Batten (2008) identify a strong relationship between Latin American euro credit spreads, country-specific exchange rate and the US term premium, the letter being a proxy of the business cycle.

Riedel, Thuraisamy, and Wagner (2013) use Markov Switching models to analyse USD Latin American sovereign spreads between 2000 and 2011 and state that the magnitude of spread determinants varies with the states of the cycle variable, in particular the US term structure factors exhibit much higher magnitudes under high volatility state. Their results also indicate that both local currency exchange rate and the Euro/USD rate are significant spread drivers.

Burger and Warnock (2006) analyse capital flows into emerging market local currency bonds and observe that, despite potential diversification benefits, mutual fund investors avoid those assets due to macroeconomic uncertainty and they tend to invest in countries with low inflation and strong institutions. Burger, Warnock, and Warnock (2010) underline that development of local currency bond markets depends mainly on legal rights and inflation volatility.

III.6 Factors determining spreads on local currency bonds

As for LC bonds yields the empirical literature is relatively scarce. Gadanecz, Miyajima, and Shu (2014) find that exchange rate risk is a key determinant of EME local currency sovereign bond yields. Exchange rate risk could rise due to both domestic and international factors and amplify the negative impact of these factors on bond yields. Du and Schreger (2013) compare the currency-hedged local currency yield with pure foreign currency yield for emerging sovereigns bonds and find that the local currency yield responds less to global fluctuations in yields.

III.7 Link between LC and FC Debt, Currency Hedging, Covered Interest Rate Parity and Basis Swap

To make the default risk on LC and FC bonds of the same issuer comparable Du and Schreger (2013) introduce a new measure of sovereign risk based currency swaps. Their approach shows that the LC spread over UST can be decomposed into currency- and credit-specific spreads, with KC currency spread accounting for ca. two thirds of the entire LC spread. Interestingly, this decomposition indicates that LC credit spreads are generally lower and less correlated with global risk factors than FC credit spreads.

Popper (1993) analyses the covered interest rate parity for long-maturity bonds of major risk-free developed economies as compared to shorter maturities. Her findings for the 1985 to 1988 period indicate that the deviation for longer maturities does occur, but the extent of deviations in the long part of the yield curve is only slightly larger, ca. 10 bps, than in the short part.

McBrady and Schill (2007) focus on the currency choice of sovereign and sub-sovereign issuers from developed and emerging economies in terms of market timing and prove that borrowers tend to exploit cross-currency differences in covered and uncovered interest yields. Their results indicate also that the average new bond offering precedes a large and beneficial depreciation of the issue currency of around 150 bps over the course of the following year.

Lustig and Verdelhan (2007) find that investors on average earn large excess returns simply by taking long positions in baskets of currencies with high interest rates and shorting baskets of currencies with low interest rates, regardless of the history of interest rate differences for individual currency pairs. Also, they establish that currencies sorted by interest rates share a lot of common variation and that returns on carry trade currencies depend on the state of risk aversion and world consumption growth rates.

As for anomalies in corporate bond markets, Zvi Wiener and Dan Galai (2009) find that even if the issuing company is not an exporter companies, its foreign currency borrowing is cheaper when the exchange rate is positively correlated with the return on the company's assets.

Munro and Wooldridge (2011) analyse the borrowing behavior of governments issuing in both local and currency markets. They find that numerous borrowers prefer to issue interest-rate-swap-covered foreign currency bonds instead of tapping directly the local currency market.

Hypothesis 4: assuming that FX-hedged LC default risk equals the FC default risk, hedged LC yields should fit the covered interest rate parity, i.e. the spread between FX-hedged LC yield and foreign currency yield should be marginally small or equal to transaction costs.

IV.1. Default Risk and Bond Maturity

Cristina Arellano (2008) and Cristina and Ramanarayanan (2012) establish a theoretical model explaining that changes in the sovereign spread curve result from the shocks in GDP growth and issuance dynamics on one hand, and risk aversion on the other. Their results indicate that during periods of high risk aversion issuers tend to auction short-maturity debt. Jeanne (2003) presents a theoretical model where for both private and public issuers the share of foreign currency debt is related to the credibility of monetary policy and inflation volatility.

Both authors argue that governments facing long-term liabilities have more incentives to inflate the debt away than with short-term liabilities since higher inflation would be reflected in higher interest rates on debt that has to be rolled over. In the later case government needs to inflate very aggresively to achieve a significant reduction of the debt burden.

IV. Data and Methodology

IV.1. Data

The novelty of our approach consist in merging local currency bonds with foreign currency bonds into one dataset. At the beginning of our data identification process we have searched for all available foreign currency bonds in Bloomberg and Datastream and chose the first dataset due to the wider and more complete coverage. Bloomberg provides data on yields, bid-ask spreads, currency of issuance, maturity and outstanding amount. At the outset of the project we have identified 20 emerging economies and 10 advanced countries that issued 1350 foreign currency bonds with sufficient historical data to conduct the analysis, as indicated in Appendix Table 1. In the first step of the data identification process we have excluded bonds all that require non-conventional pricing methods and are labelled by Bloomberg as restructured, exchanged, funged or based on a step-up coupon.

The availability of foreign currency bonds is not the only factor limiting the scope of our analysis, however. We attempted creating a similar database for local currency bonds, but the coverage range for emerging economies ranged from zero to mediocre at best. This is why we decided to use historical series of yield curves provided by Datastream for maturities between 1-year and 30-years. On average the breadth and historical availability of local currency yields exceeded the availability of foreign currency yields. Statistics for the average starting date of historical data for individual countries presented in Appendix Table 1 indicate that for seven countries local currency curves provided by Bloomberg or Thomson Reuters start later than the series for foreign currency bonds.

On top of that we have not been able to identify zero coupon curves for Argentina and Venezuela, whereas in the case of South Africa the local currency yield turned out to be, to a great extent, incomplete and inconsistent. To overcome these issues we have analyzed historical series for individual local currency bonds, but the curves constructed in this way generated less data points than the curves provided directly by Bloomberg.

Last but not least, Table 1 provides an overview of the control variables and their respective sources. For holdings of government bonds denominated in local currencies we use the dataset compiled by Arslanalp and Tsuda (2014). For the duration measures by country we use country data from JPM Indices.

IV.2. Calculation of Bond Yields and Foreign Currency Hedging

In this section we outline our approach to calculate the yields in local and foreign currency, foreign currency hedging and finally we present the econometric approach.

i. Yields

If we took the conventional yield for the foreign exchange bonds, we would implicitly assume a flat yield curve. We thus take into account the fact that the foreign exchange yield curve might have a positive or negative slope. For instance, if the foreign exchange yield curve has a positive slope, the yield of the foreign exchange bond is higher than the conventional yield and vice versa. Mathematically, we calculate the z-spread of the foreign currency bonds over the US zero coupon yield curve. By doing so we assume the slope of the foreign currency yield to be the same as the slope of the US yield curve.

ii. Foreign Exchange Hedging

For each local currency bond yield in our sample we calculate future curves against the dollar by supposing a piecewise linear relation ship between each maturity. For each local currency bond we match its maturity with a synthetic currency future in order to calculate the hedge:

$$\text{Eq. 11} \quad \text{hedge}_{\text{LC,mt}} = \frac{\text{future}_{\text{LCtoFC,mt}}}{\text{spot}_{\text{USDtoFC,mt}}} - 1$$

Where FC stands for foreign currency, LC for local currency, m for the maturity and t for time.

We match exactly the maturity of the local and foreign currency bonds, whereas a real portfolio manager would most likely use a 3 months rolling hedge to protect his investment as 3 months currency futures are the most liquid. From an academic standpoint, matching the maturity is the

accurate way to do it. As a result, we take the exact match and use the 3 months hedge as a robustness check.

The FCLC spread is calculated as follows:

Eq. 12 $\text{FCLC}_{\text{mnt}} = \text{yield}_{\text{FC,mnt}} - (\text{yield}_{\text{LC,mt}} + \text{hedge}_{\text{LC,mt}})$

Where n is the bond issue, $\text{yield}_{\text{FC,mnt}}$ is the observed foreign currency yield, $\text{yield}_{\text{LC,mt}}$ is the local currency yield derived from the local currency yield curve and FCLC the resulting spread between the foreign currency yield and the hedged local currency yield.

In a second step we calculate in the same fashion future curves against the dollar for all foreign currencies in our sample. We are thus able to compare bonds in Yen, Euro and Pounds against the dollar.

IV.3. Econometric Approach

We smooth our dataset to reduce noise by taking the average over three months of any given variable. We think this gives our results additional stability compared to Du and Schreger (2013) who use monthly observations for their regressions. Our results are robust to not smoothing at all or smoothing over 6 months. We perform panel regressions by using time, country and currency fixed effects. Our results are robust to fixed effects on the bond level instead of the country level. The panel autocorrelation test by Wooldridge (2001) detects a first order autocorrelation. A likelihood ratio test detects heteroscedaticity. We thus control for both at the residual level. All results are robust to regressions without the financial rating. Controlling for the debt crisis in 2009 does not alter the meaning of the results. We also used the dynamic linear panel regression by Arellano and Bond (1991) on the data to check if autocorrelation alters the results. The dynamic linear panel seems to exhibit unstable results with our data. As previously noted by David Roodman (2009), the model is very sensitive to changes on the instrumentalization and the lag structure of the explanatory variables.

Moreover, we restrict the sample to maturities between 1 and 5 years. We chose to make this our sample of reference for two reasons: first, bonds below one year loose most of their default risk and second, the future currency curves beyond a maturity of 5 years are very illiquid.

We include three bond specific control variables: the maturity, the squared maturity and the issue size.

V. Empirical Results

In this section we present the information on data distribution, descriptive statistics and econometric results.

V.1. Data Distribution by Country, Currency and Maturity

The originality and broad coverage of our dataset require a thorough investigation of the underlying data before the analysis.

Statistics in Table 2a indicate that USD remains the main currency of issuance of foreign currency bonds. Interestingly, while emerging countries tend to issue foreign currency bonds denomination mainly in EUR, JPY and USD, while developed countries issue also in CHF and GBP. Table 2b shows that the majority of observations is available for USD bonds (over 6500), followed by Euro and its predecessors (over 1800), whereas JPY and GBP bonds have around 1400 observations each. Relatively few observations are available for the CHF.

Graphs 3 and 4 present the historical distribution of observations of foreign bond yield by issuance currency. While most data points for developed countries are located between 1998 and 2006 and distribution is equally spread over time, data for emerging economies begins in 2003 and most observations can be found between 2009 and 2013. This is why it is important to be cautious about analysing FC yields during sub-periods.

Following the same approach we also studied the time distribution of data by maturity segments. Graphs 5 and 6 indicate that the short, medium and long-term maturities are evenly distributed for developed countries, but not for the emerging economies. We find that the majority of FC yields for developed economies are located in the 1Y to 5Y segments, while observations for emerging markets yields are concentrated on long-term maturities between 7-10Y and above 10Y. We need to account for this distribution pattern of maturity structure in the further analysis.

Finally, Table 3a shows the data availability of the FCLC spread differs strongly from country to country. For instance Sweden has 92 foreign currency denominated bonds in our sample whereas South Africa has only 2. Note that Brazil, Ireland and South Africa do not have any observations in the final sample due to missing observations of the hedge.

V.2. Descriptive Statistics

In this section we describe the statistical findings on foreign and local currency bond yields.

Data from JPM Indices reveals interesting patterns concerning duration of local and foreign currency bonds in emerging economies represented by GBI-EM and EMBI indices respectively. **First, it is remarkable that the duration of foreign currency bonds increased from 4Y in 1998 to over 7Y in 2013 indicating that investors' confidence towards emerging economies increased over time. Second, Graph 7 shows that between 2004 and 2014 duration of foreign currency bonds was over 2 years longer than local currency bonds.** Graphs 8 to 10 show that only in South Africa and Russia there was no duration difference in late 2013, in Poland, Peru and Indonesia it was around 2Y, whereas in Brazil, Colombia and Turkey FC bonds have on average 4Y longer duration than LC bonds.

Table 4 depicts the average spread between the USD-hedged foreign currency yield and the hedged local currency yield in advanced economies. **Canada, Denmark and Sweden and Core Eurozone the foreign currency yield oscillates very closely around the FX-hedged local yield** within 1% range. Conversely, in **Greece and Spain FC yield is consistently higher than hedged LC yield during the period of euro introduction and the euro-crisis.** It is remarkable that the strong spread deviations ranging between 5% and 14% appear mainly in long maturities above 5 years where the currency hedge is difficult to establish. As for the spread between foreign yield and unhedged local currency yield, Table 5 shows that the unhedged spread was relatively high during the period 1996-2001, diminished over time to 1%-2% by 2007 and stabilized at this level everywhere except for Greece. Graphical analysis of the spreads of foreign vs. local hedged bond spreads for maturities of 1Y and 5Y confirm our findings. The spread between foreign and FX-hedged local currency yields were historically in the range of -0.5% to 1.5% which is relatively low. It is however noteworthy that in Austria, Belgium and Finland the spread jumped to around 4% around 2000-2001 crisis, as shown in Graph 11.

In contrast, in emerging economies the spread between FC yield and FX-hedged LC yield is positive and we can observe strong differences between countries. Results in Table 6 **indicate that in Brazil, Chile, Israel, Malaysia, Poland and Philippines the spread 1Y to 5Y ranges between low 1% to 4%, whereas in Hungary, Mexico, Russia and Turkey spreads broadly**

exceeded 8%. In a nutshell, this shows that foreign investors require higher yields on FC bonds than local investors require on LC bonds hedged into USD. Hence we can argue that the default risk on FX-hedged local default risk is different from the FC default risk, which also means that the covered interest rate parity is not maintained and we refute hypothesis 4. Moreover, at longer maturities the spreads often exceed 15%. Graphical representation can be found in Graphs 13 to 16. In Hungary, Turkey, Russia and Philippines skyrocketed around the 2008 crisis breaking the 8% level. Finally, it is noteworthy is that **Israel and Thailand experienced short-lived jumps during the periods of political and military tensions.**

Investigation of the spread between FC yield and unhedged LC yield reveals different and highly interesting results for emerging economies. Table 7 shows that the spread between FC yields and unhedged LC yields in emerging economies moved from positive between 2002-2007 period, when data coverage was relatively weak, to negative in 2007-2013**. During the most recent period in most emerging economies the LC local bond yields were higher than FC yields by 1% to 3%, while in Russia, Indonesia and Turkey LC yields were higher than FC yields by 4% to 8%. This explains why it remains interesting for those countries to issue debt in foreign currencies.**

To sum up the results for the uncovered interest rate parity, the spread between LC and FC yields in advanced economies has been relatively low except for Greece and Spain, while in emerging economies the FC yield remains lower by 1% to 3% than the unhedged LC yield. Moreover, the duration of FC bonds issued by emerging economies has almost doubled between 1998 and 2013 and remains considerably higher than duration of local currency bonds. These two effects explain why emerging economies continue to issue debt in foreign currencies despite the associated risks.

As for the spread between FC yields and FX-hedged LC yields, it is marginally low in developed countries and investment grade emerging economies, but becomes high in riskier developed and emerging countries, e.g. Greece, Spain, Russia or Turkey, reaching at times 8% level. These results suggest that sovereign risk on FC debt might be perceived differently from LC debt causing the deviations from covered interest parity. In consequence we refuse hypothesis four.

V.3. Panel Regression Results

Based on divergences in yields and spreads observed in the descriptive statistics we separate our sample into emerging and developed countries. We then regress the local currency yield, the hedged local currency yield, the USD-hedged foreign currency yield as well as the spread between the USD-hedged foreign exchange yield and the hedged local currency yield (FCLC spread) on political risk indicator, macroeconomic and fiscal indicators, ratings and bond-specific variables. To ensure the robustness of our work and verify the validity of the proposed hypothesis we run the regressions for different subsamples. We begin at the entire sample, than we focus at the sample that has only observations common to local currency and foreign currency yields. Subsequently we split the sample into bonds that qualify as investment grade and non-investment grade. In the third stage we differentiate between countries where the share of local currency debt to total debt is above or below the sample average of 83%. Next we distinguish between countries where the share of foreign investors is high and low, i.e. above or below the sample average of 40%. Finally, we investigate the specific case where over 40% of debt is held by foreign investors and the government debt is predominately denominated in local currency.

Complete econometric results are presented in Tables 9 to 17. To simplify the interpretation we summarized the estimated coefficients by indicator and setting in Tables 18 to 23. In terms of econometric results for control variables the maturity always has the expected positive and significant sign, i.e. the higher the maturity the higher the maturity premium and hence the yield. The squared maturity hast the expected negative sign. The variable issue size, used as proxy for liquidity of the bond issue, is only slightly significant for the unhedged local currency yield and it has the expected negative sign.

iii. LC and FC Yields Reaction to Political Risk

Table 18 demonstrates that political risk is generally significant across constellations and has the expected positive sign. Findings on the broad sample indicate that the unhedged local currency yield and foreign currency yield are relatively uncorrelated with political risk in emerging markets, but the relationship is positive and significant for developed economies.

Interestingly, **in emerging countries with high share of LC debt and high share of foreign participation, the coefficients for LC yield and FC yield are significant and stronger than for the broad sample**. Specifically, in emerging economies the broad sample estimates for

LC yield are non-significant, the coefficient for investment grade equals 0.03, whereas coefficients for high share of LC debt, high foreign participation and combination of both equal respectively 0.12, 0.14 and 0.21 and on top of that are highly significant. For FC yield the broad sample coefficient is 0.02, high share of LC debt 0.08, high share of foreign participation 0.07, and combination of both 0.10. The result for developed economies are difficult to interpret due to non-linearities. **These findings suggest not only higher foreign participation, but also more developed local currency bond markets render valuation of government bonds more prone to local political risk factors.** This rejects the hypothesis 3a.

Moreover, results for emerging economies are significant and have similar magnitudes for unhedged LC and FC yields in the following settings: high share of LC debt (0.12 vs. 0.08), high share of foreign participation (0.14 vs. 0.07), and both combined (0.21 vs. 0.10). Hence, **the hypothesis 3b is confirmed, i.e. at high levels of foreign participation political risk has significant and similar effect on LC yields as on FC yields.**

Results for the common sample indicate that the spread between FC and hedged LC Yield tends is significantly and positively related to political risk, i.e. **for 1% rise in political risk foreign yield increases by 11 to 53 bps more than the hedged local currency yield**. Also, it is surprising that the FCLC spread has a stronger coefficient for developed economies than for emerging countries. This might be due to non-linearities around the Eurozone crisis, as results vary along with credit worthiness. While for investment grade bonds the results are non-significant, for non-investment grade the coefficient is significant and very strong.

Table 18 Result Summary for Political Risk

	LC Yield		Hedged LC Yield		FC Yield		Hedged FC LC Spread	
Sample	**EM**	**DM**	**EM**	**DM**	**EM**	**DM**	**EM**	**DM**
Full Sample	n/s	n/s	0.13**	n/s	0.02*	0.38***	0.11***	0.53***
Common Sample	n/s	0.05**	0.13**	n/s	n/s	0.59***	0.11***	0.53***
Investment Grade	0.03*	0.03**	0.23***	n/s	n/s	n/s	0.20***	n/s
Non-investment Grade	-0.27***	-0.13***	n/s	-0.23***	n/s	3.11***	n/s	3.13***
High Share of Local Currency Debt	0.12***	0.05*	0.20**	n/s	0.08***	0.52***	n/s	0.44***
Low Share of Local Currency Debt	n/s	n/s	0.34*	n/s	n/s	n/s	0.36**	n/s
High Share of Foreign Investors' Holdings	0.14***	n/s	0.41***	n/s	0.07*	0.45***	0.19**	0.47***
Low Share of Foreign Investors' Holdings	0.10***	0.33***	0.40***	0.29***	n/s	0.21***	0.22***	n/s
High Share of Foreign Holdings and High Share of LC Debt	0.21***	0.32***	0.33***	0.32***	0.10***	0.23***	n/s	n/s

Note: n/s stands for not significant

iv. LC and FC Yields Reaction to Inflation

Results in Table 19 indicate that under **rising inflation LC and FC yields increase in emerging economies, but decrease in developed economies**. For developed economies this effect is unexpected and might be due to the unconventional monetary policies or the behaviour of Eurozone yields during the crisis.

In case of LC yields in emerging economies, the **coefficient for inflation is lower when the country has the investment grade status, but the coefficient increases when the country's debt is mainly in local currency and when the foreign participation is high**. These results are in line with the findings on political risk.

The impact of inflation on the FX-hedged LC yields is positive considerably stronger than on unhedged yields or FC yields. Nevertheless, the FC LC spread is positively correlated to inflation for emerging economies and negatively for developed ones.

Table 19 Result Summary for Inflation

	LC Yield		Hedged LC Yield		FC Yield		Hedged FC LC Spread	
Sample	**EM**	**DM**	**EM**	**DM**	**EM**	**DM**	**EM**	**DM**
Full Sample	0.41***	n/s	1.36***	-0.45***	n/s	-0.74***	0.49***	-1.27***
Common Sample	0.45***	-0.16***	1.36***	-0.47***	0.05**	-1.11***	0.49***	-1.27***
Investment Grade	0.15***	-0.21***	0.62***	-0.41***	n/s	-0.22***	0.37**	-0.22*
Non-investment Grade	n/s	n/s	0.37*	n/s	0.15***	n/s	0.54**	n/s
High Share of Local Currency Debt	0.59***	n/s	1.43***	n/s	0.07**	-2.46***	0.35***	-2.46***
Low Share of Local Currency Debt	0.34***	n/s	1.57***	n/s	0.07**	n/s	0.87***	n/s
High Share of Foreign Investors' Holdings	n/s	-0.13**	-0.40**	-0.60***	0.03	-0.70***	-0.29*	-1.07***
Low Share of Foreign Investors' Holdings	0.57***	0.80**	1.75***	1.27**	0.11***	n/s	0.70***	n/s
High Share of Foreign Holdings and High Share of LC Debt	0.95***	0.83***	2.42***	1.24***	0.09***	n/s	0.66***	n/s

Note: n/s stands for not significant

v. LC and FC Yields Reaction to Sovereign Rating

The findings in Table 20 confirm that higher credit rating is significantly associated with lower yields and lower FC LC Spreads, which suggests that **higher rating reduces the difference in foreign currency and FX-hedged local currency default risk**. We also observe that **in emerging economies the relative importance of rating increases when the share of LC debt and foreign participation rise.**

Again, the effect of ratings is stronger for hedged LC yield than for unhedged LC yield. It is also remarkable that foreign currency yields are significantly related to ratings only in developed economies.

Table 20 Result Summary for S&P Rating

	LC Yield		Hedged LC Yield		FC Yield		Hedged FC LC Spread	
Sample	**EM**	**DM**	**EM**	**DM**	**EM**	**DM**	**EM**	**DM**
Full Sample	-0.19***	-0.37***	-0.84***	-0.45***	n/s	-0.71***	-0.22***	-0.38***
Common Sample	-0.31***	-0.28***	-0.84***	-0.30***	n/s	-0.64***	-0.22***	-0.38***
Investment Grade	n/s	-0.16***	n/s	-0.19***	n/s	-0.18***	n/s	n/s
Non-investment Grade	0.52***	-0.67***	n/s	-0.84***	0.19***	n/s	n/s	0.59***
High Share of Local Currency Debt	-0.51***	-0.28***	-1.14***	-0.29***	-0.07***	-0.62***	-0.20**	-0.37***
Low Share of Local Currency Debt	-0.39***	n/s	-1.41***	n/s	n/s	n/s	-0.55**	n/s
High Share of Foreign Investors' Holdings	n/s	-0.29***	n/s	-0.32***	n/s	-0.74***	n/s	-0.48***
Low Share of Foreign Investors' Holdings	-0.35***	-0.06*	-0.99***	n/s	n/s	n/s	-0.27***	n/s
High Share of Foreign Holdings and High Share of LC Debt	-0.77***	-0.06*	-1.60***	n/s	-0.09***	n/s	-0.21*	n/s

Note: n/s stands for not significant

vi. LC and FC Yields Reaction to Debt to GDP

The relationship between yields and debt to GDP is characterized by a certain dichotomy between emerging and developed economies. **In emerging economies higher debt to GDP is related to higher LC yields and FC LC Spreads, while in developed economies FC yields and spreads tend to be lower.** In emerging economies the coefficient for debt to GDP again becomes stronger under high share of foreign holdings and high share of LC debt.

Table 21: Result Summary for Debt to GDP

	LC Yield		Hedged LC Yield		FC Yield		Hedged FC LC Spread	
Sample	**EM**	**DM**	**EM**	**DM**	**EM**	**DM**	**EM**	**DM**
Full Sample	0.06***	n/s	0.40***	n/s	n/s	-0.16***	0.14**	-0.34***
Common Sample	0.12***	n/s	0.39***	n/s	n/s	-0.29***	0.14**	-0.34***
Investment Grade	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Non-investment Grade	0.40***	0.07***	n/s	0.11**	n/s	0.33**	n/s	0.29*
High Share of Local Currency Debt	0.23***	n/s	0.43***	n/s	n/s	-0.42***	n/s	-0.43***
Low Share of Local Currency Debt	0.16**	n/s	0.66**	n/s	n/s	n/s	n/s	n/s
High Share of Foreign Investors' Holdings	0.10***	0.08***	0.46***	n/s	n/s	-0.17*	0.24**	-0.35***
Low Share of Foreign Investors' Holdings	0.25***	-0.22***	0.72***	-0.19***	n/s	-0.13***	0.24***	n/s
High Share of Foreign Holdings and High Share of LC Debt	0.42***	-0.21***	0.86***	-0.20***	n/s	-0.13***	n/s	0.09**

Note: n/s stands for not significant

vii. LC and FC Yields Reaction to FX Reserves to External Debt

Table 22 indicates that **the external coverage ratio has limited impact on LC yields and no significant impact on FC yields**. Only in investment grade countries the LC yields shrink under better external coverage and the coefficient is relatively low.

Table 22: Result Summary for FX Reserves to External Debt

	LC Yield		Hedged LC Yield		FC Yield		Hedged FC LC Spread	
Sample	**EM**	**DM**	**EM**	**DM**	**EM**	**DM**	**EM**	**DM**
Full Sample	0.02***	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Common Sample	n/s	n/s	n/s	-0.23**	n/s	n/s	n/s	n/s
Investment Grade	-0.01**	-0.09**	-0.08***	-0.29***	n/s	n/s	-0.05***	n/s
Non-investment Grade	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
High Share of Local Currency Debt	0.02**	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Low Share of Local Currency Debt	-0.11***	n/s	-0.36***	n/s	-0.03***	n/s	-0.16*	n/s
High Share of Foreign Investors' Holdings	n/s	n/s	n/s	-0.49***	n/s	n/s	n/s	n/s
Low Share of Foreign Investors' Holdings	0.02***	0.04*	0.06**	0.07**	n/s	n/s	n/s	n/s
High Share of Foreign Holdings and High Share of LC Debt	n/s	5.70***	-0.09***	7.99***	n/s	3.29*	-0.08***	n/s

Note: n/s stands for not significant

viii. LC and FC Yields Reaction to Current Account Balance

Results in Table 23 indicate that external sustainability matters. **Countries with higher current account balance have significantly lower LC yields and this effect becomes more important when government debt is mainly in local currency and foreign participation is high**. Moreover, in developed countries CA balance is associated with lower FC yields and FC LC Spreads.

Table 23: Result Summary for Current Account Balance to GDP

	LC Yield		Hedged LC Yield		FC Yield		Hedged FC LC Spread	
Sample	**EM**	**DM**	**EM**	**DM**	**EM**	**DM**	**EM**	**DM**
Full Sample	-0.13***	-0.31***	n/s	-0.53***	n/s	-0.44***	n/s	-0.31**
Common Sample	-0.13***	-0.30***	-0.25*	-0.40***	0.05**	-0.51***	n/s	-0.31**
Investment Grade	-0.16***	-0.08***	-0.31*	-0.22***	n/s	n/s	n/s	n/s
Non-investment Grade	-0.20***	-0.95***	-0.44**	-1.01***	n/s	-3.01***	n/s	-2.15**
High Share of Local Currency Debt	-0.31***	-0.18***	-0.58***	-0.23***	n/s	n/s	n/s	n/s
Low Share of Local Currency Debt	-0.19***	n/s	n/s	n/s	n/s	n/s	n/s	n/s
High Share of Foreign Investors' Holdings	n/s	-0.32***	n/s	-0.51***	n/s	-0.47***	n/s	-0.40**
Low Share of Foreign Investors' Holdings	-0.16***	-1.47***	-0.44**	-1.03***	0.04*	-0.66**	n/s	1.31*
High Share of Foreign Holdings and High Share of LC Debt	-0.75***	-1.42***	-1.63***	-1.15***	n/s	-0.73**	n/s	0.94**

Note: n/s stands for not significant

ix. Summary of empirical results

Between 1993 and 2013 the amount of government debt issued in foreign currency increased from approx. $350bn to over $1800bn. While foreign currency debt represented less than 5% of debt of developed economies over this period, emerging economies successfully reduced their reliance on foreign lending from 60% to 30%. Having said that, the issuance of FC debt by emerging economies has picked up in the recent years and foreign indebtedness is likely to remain an important risk factor for those countries in the years to come.

Statistical findings help explain why emerging economies continue to issue in foreign currencies. In fact, the spread between LC and FC yields in advanced economies has been relatively low except for Greece and Spain, whereas in emerging economies the FC yield remains lower by 1% to 3% than the unhedged LC yield. Moreover, the duration of FC bonds issued by emerging economies has almost doubled between 1998 and 2013 and remains considerably

higher than duration of local currency bonds. These two effects explain why emerging economies continue to issue debt in foreign currencies despite the associated risks.

Subsequently we synthetize the econometric results through the prism of the hypotheses set earlier.

Hypothesis 1: unhedged local currency yields and foreign currency yields should respond differently to unfavorable changes in inflation, debt fundamentals and political risk

In emerging economies political risk has significant and similar impact on LC and FC yields, yet inflation has a stronger effect on LC yields than on FC yields. Surprisingly, LC yields in those countries react strongly to changes in current account balance and debt to GDP, while foreign yields remain immune to those indicators. In contrast, in developed economies FC yields react more strongly to changes in political risk, inflation, credit rating and current account than LC yields. Hence, in general we accept the hypothesis one.

Hypothesis 2: Shocks in risk factors have a higher impact on the FCLC spread of non-investment grade bonds than on investment grade bonds.

Econometric results show that yields of non-investment grade bonds exhibit stronger reaction to political risk in developed economies than investment grade bonds. In emerging economies we observe that non-investment grade bond yields have slightly stronger coefficients than high rated bonds. Hence, credit worthiness determines in certain cases determines the reactivity of yields to risk indicators, which qualifies the hypothesis two as partly confirmed.

Hypothesis 3a: countries with more developed local currency bond markets, i.e. where the share of local currency debt to total debt is high, are more immune to risk factors. As a result, local currency bonds should react less to political and inflation shocks than foreign currency bonds. Inversely, foreign investors may fear to be discriminated if the share of foreign currency debt is too high.

Hypothesis 3b: at high levels of foreign participation in local currency bonds, determinants of local currency yields should resemble those of foreign currency yields

We do not find unambiguous confirmation for the hypothesis 3a and 3b, i.e. neither the share of LC debt nor the foreign participation alone seem to influence yield reactivity to risk factors. However, in emerging countries with high share of LC debt and high share of foreign participation the estimated coefficients for political risk, inflation, credit rating and current account are significant and considerably stronger than for the full sample. Interestingly, under high foreign participation and high share of LC debt, the coefficients are stronger for LC yield than for FC yield. These findings suggest that not only higher foreign participation, but also more developed local currency bond markets render valuation of government bonds more prone to local risk factors.

Hypothesis 4: assuming that FX-hedged LC default risk equals the FC default risk, hedged LC yields should fit the covered interest rate parity, i.e. the spread between FX-hedged LC yield and foreign currency yield should be marginally small or equal to transaction costs.

The spread between FC yields and FX-hedged LC yields is marginally low in developed countries and investment grade emerging economies, yet it becomes high in riskier developed and emerging countries, e.g. Greece, Spain, Russia or Turkey, reaching at times 8% level. These results suggest that sovereign risk on FC debt might be perceived differently from sovereign risk of LC debt causing the deviations from covered interest parity. In consequence we refuse hypothesis four.

Econometric results for the common sample indicate that the spread between FC and hedged LC Yield tends is significantly and positively related to political risk, i.e. for each 1% rise in political risk foreign yield increases by 11 to 53 bps more than the hedged local currency yield. Interestingly, both rising inflation and debt to GDP significantly increase the FC LC spread for emerging economies, but decrease the spread for advanced economies.

VI. Conclusions and Implications for Policymakers and Investors

Over the last two decades numerous countries successfully developed local currency bond markets, yet foreign currency issuance remains an important source of funding for many emerging economies. To date, empirical literature on currency denomination of government debt was divided into two flows, one on development of LC bond markets and original sin, and second on foreign or local currency bond yields. This article combines these two schools by analysing

how fundamental and political indicators related to sovereign risk determine the LC and FC yields and the FX-hedged difference between them. The novelty of our approach consists in comparing local currency bonds with foreign currency bonds using a broad dataset of individual bonds that covering both developed and emerging countries. On top of that, we use data for the currency structure of government debt and foreign participation.

To provide a complete picture we investigate separately the unhedged LC yields, FC yields and the spread between FX-hedged LC yields and FC yields. Empirical findings lead us to conclusion that in general LC yields react more to local risk factors than FC yields and the reactivity increases when the share of LC debt to total debt or foreign participation in LC debt increase. Three major patterns emerge with regard to this conclusion.

First, basic statistical patterns help explain why government continue to issue in foreign currencies. In fact, the spread between LC and FC yields in high rating advanced economies has been relatively low, while in emerging economies the FC yield remains lower by 1% to 3% than the unhedged LC yield. Moreover, the duration of FC bonds issued by emerging economies has almost doubled between 1998 and 2013 and remains considerably higher than duration of local currency bonds. We compare the econometric determinants of the LC and FC yields and demonstrate that **in emerging economies political risk has significant and similar impact on LC and FC yields, whereas inflation, current account balance and debt to GDP are significant and have stronger effects on unhedged LC yields than on FC yields.**

Second, empirical results suggest that sovereign risk on FC debt might be perceived differently from sovereign risk of LC debt causing the deviations from covered interest parity. The spread between FC yields and FX-hedged LC yields is marginally low in developed countries and investment grade-rated emerging economies, yet it becomes high in riskier developed and emerging countries such as Greece, Spain, Russia or Turkey. **Econometric results for all countries indicate that the spread between FC yield and FX-hedged LC Yield is significantly and positively related to credit ratings and political risk. Interestingly, both rising inflation and debt to GDP significantly increase the FC hedged-LC spread for emerging economies, but decrease the spread for advanced economies.**

Third, in emerging countries with high share of LC debt and high share of foreign participation the estimated coefficients for political risk, inflation, credit rating and current

account are significant and considerably stronger than for the full sample. Interestingly, under high foreign participation and high share of LC debt, the coefficients are also stronger for LC yield than for FC yield. **These findings suggest that not only higher foreign participation, but also more developed local currency bond markets render valuation of government bonds more prone to local risk factors.**

The empirical results are relevant for policymakers, investors and governments issuing foreign currency debt. Policy makers need to take into account that countries with low foreign debt, but high foreign participation in LC debt are more vulnerable to political and macroeconomic risk factors. In turn, investors dealing with both FC and LC emerging market debt need to consider that FC yield exhibit stronger reaction to political and inflation risks than the FX-hedged LC yield. Finally, ministries of finance and treasury agencies should need to adjust their risk management and issuance policies to the currency denomination, foreign participation and country's credit risk .

In terms of further development, we see potential of extension on the empirical model to theoretical grounds, for instance investigating the impact of risk factors on yields and country's fundamentals for evolving share of LC debt and changing investor structure.

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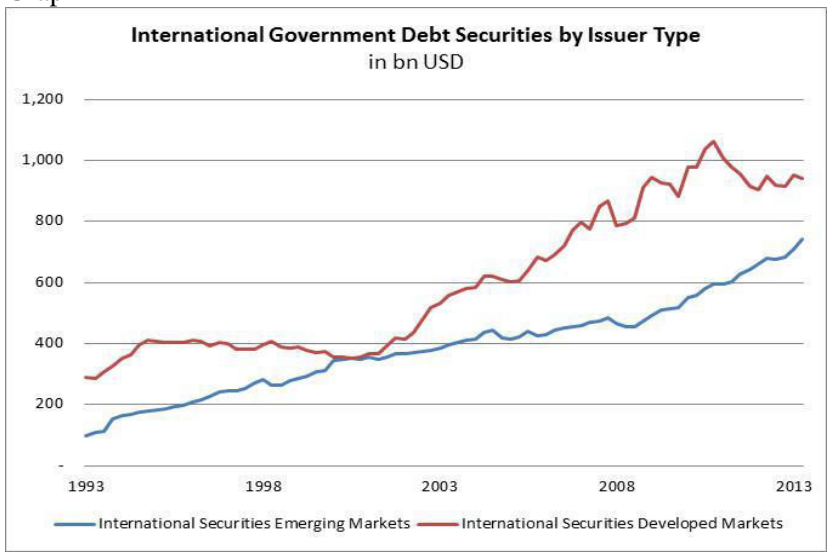
Graph 1



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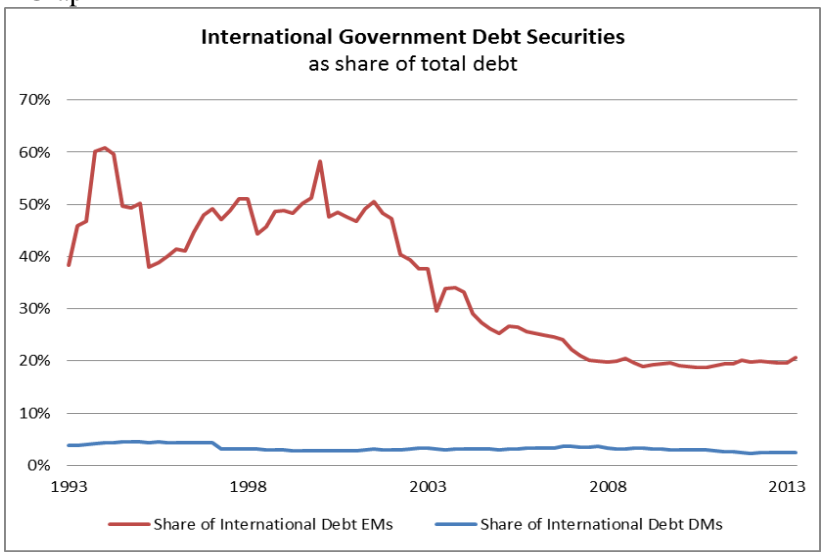

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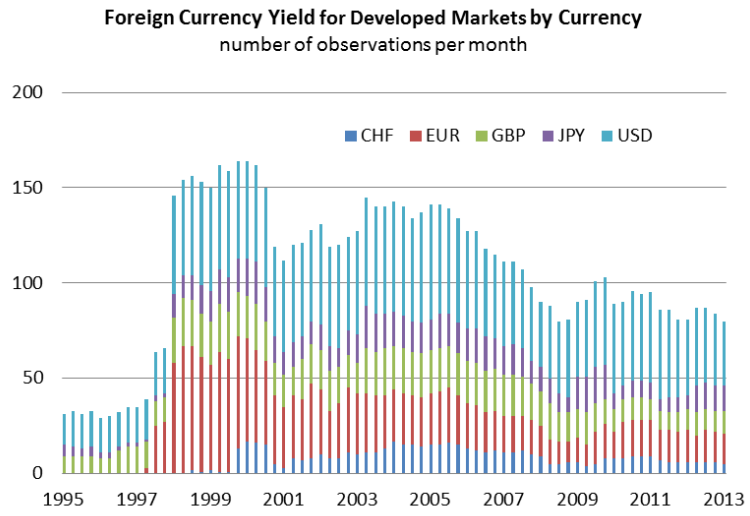

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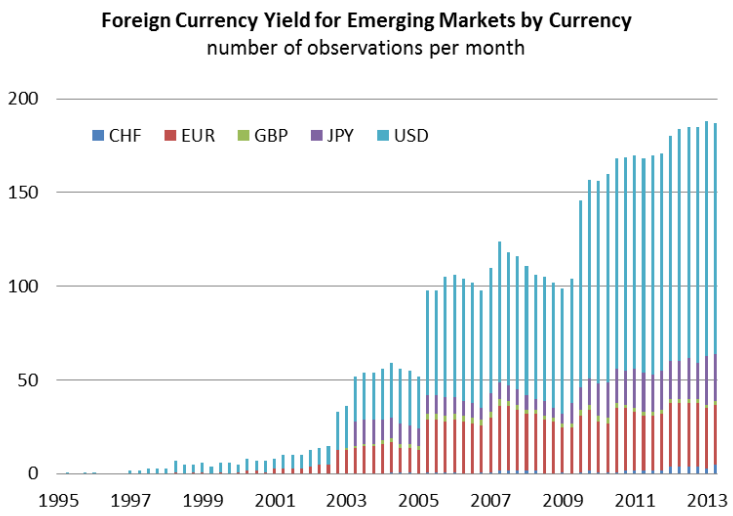

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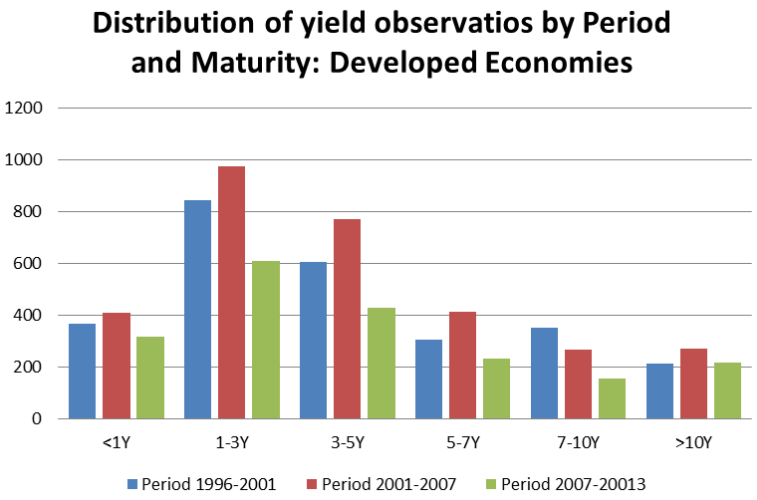

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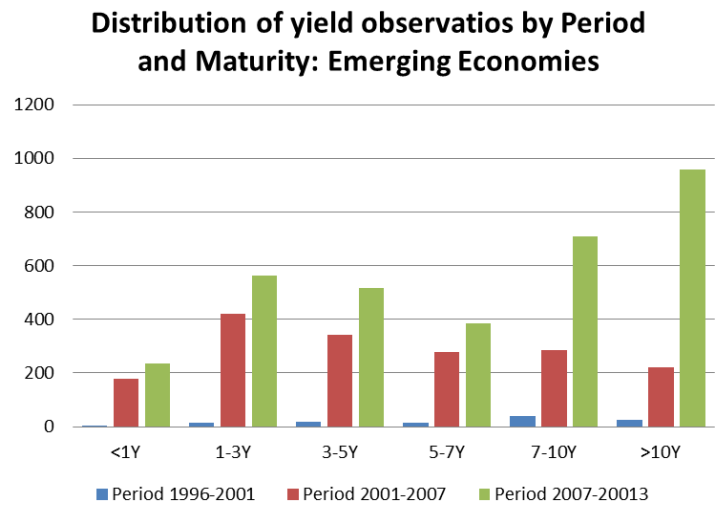

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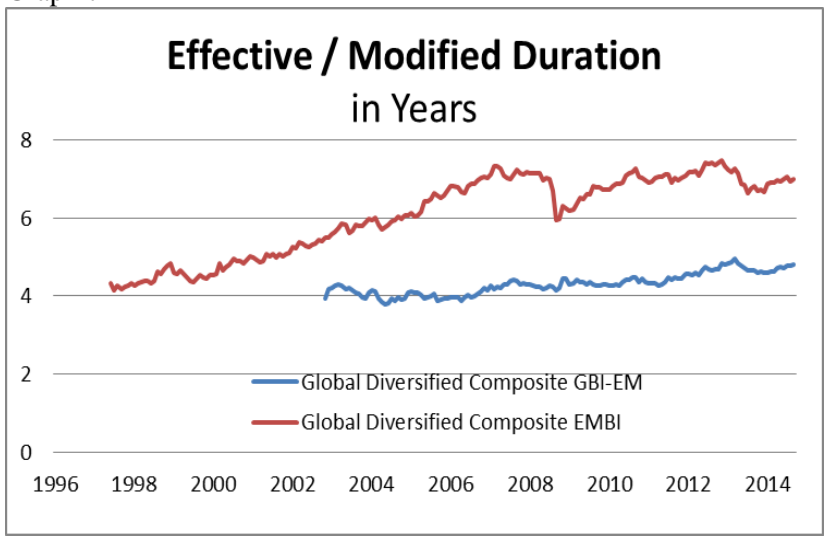

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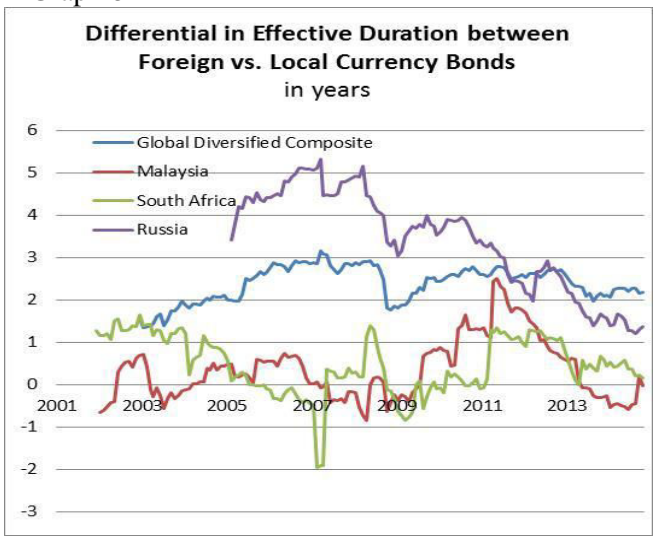

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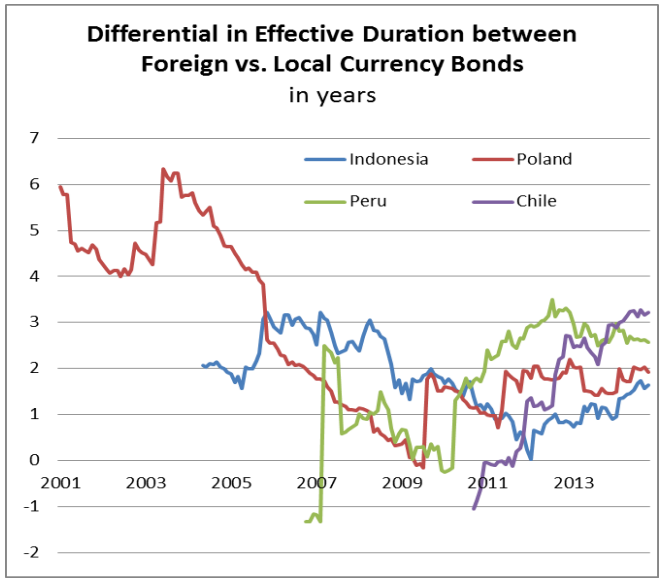

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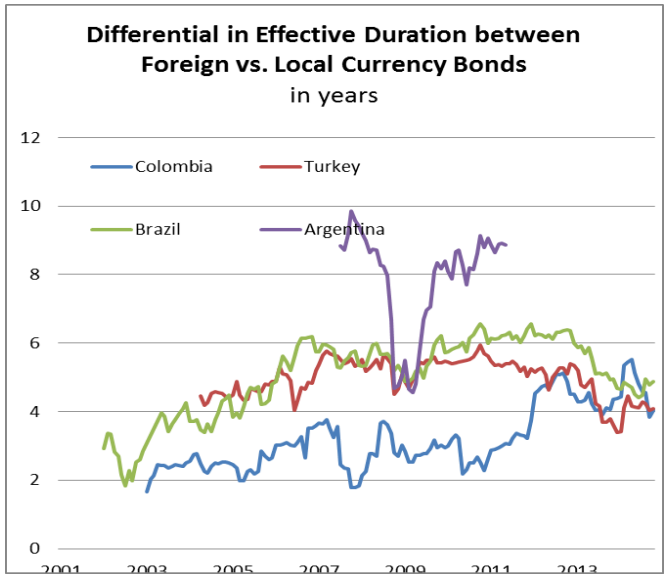

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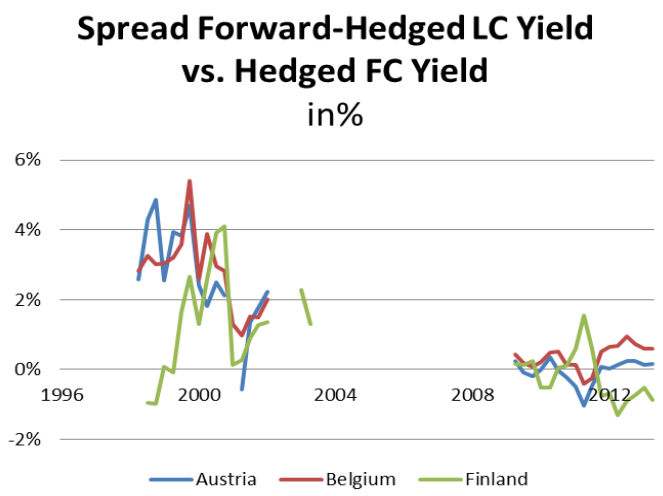

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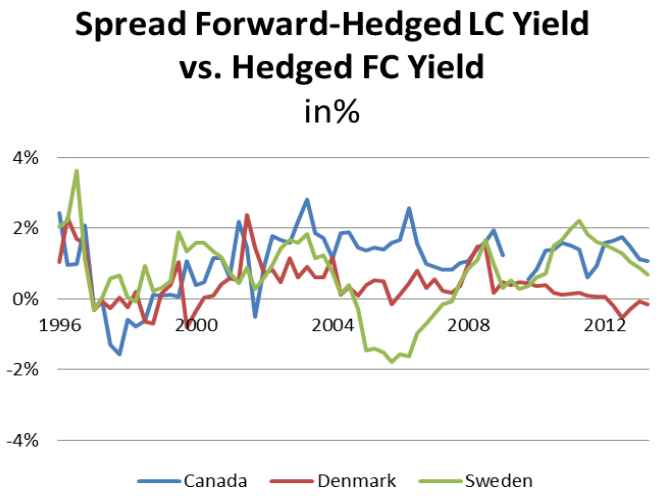

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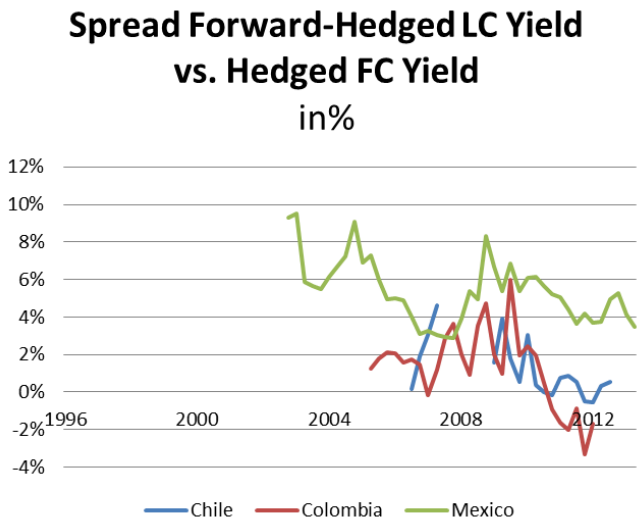

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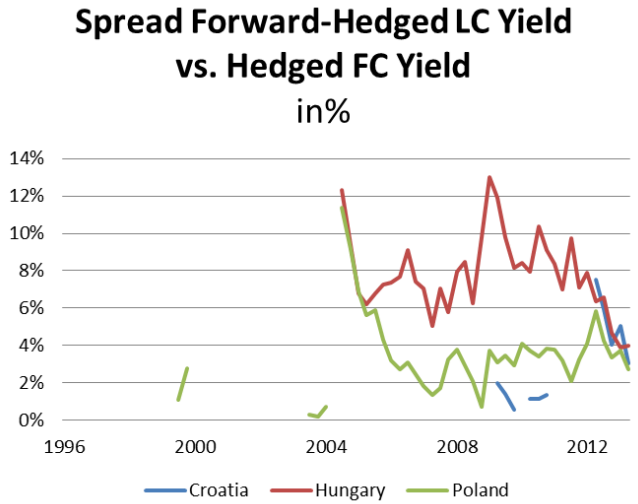

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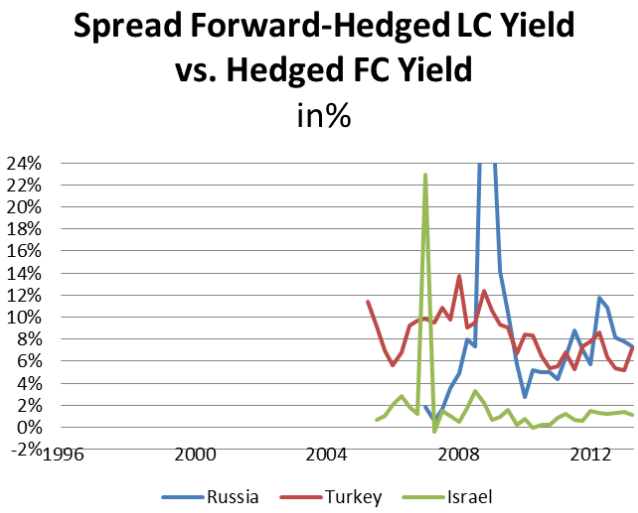

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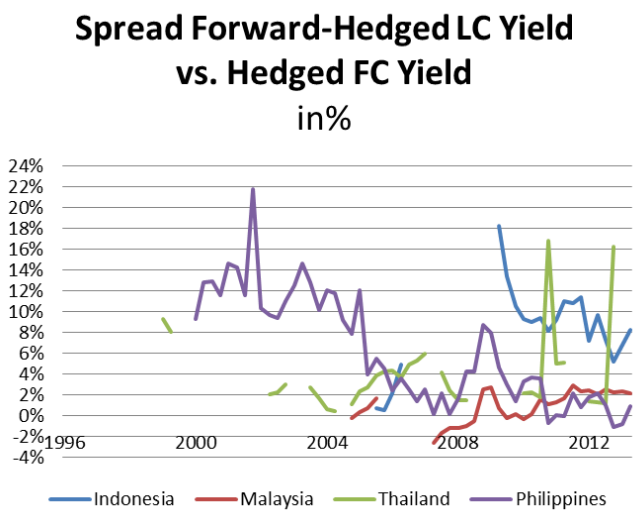

Table 1: Data Sources

Indicator	Unit	Source
CB Policy Rate	Percentage	National Sources, Bloomberg
CPI	Percentage YoY Change	National Sources, Bloomberg
Current Account Balance	Percentage of GDP	IMF IFS
Debt Servicing Cost	Interest to Total Debt. Percentage	IMF IFS
EMBI Weight	Percentage Share in the Index	JPM Indices
Exchange Rate Stability	Score 0 to 1	Chinn-Ito (2007)
External Debt	Percentage of GDP	IMF IFS
Financial Openness	Score 0 to 1	Chinn-Ito (2007)
Fiscal Balance	Percentage of GDP	IMF IFS
Fitch Rating FC	Score 0 to 1	Fitch
Fitch Rating LC	Score 0 to 1	Fitch
FX - LC Bond Yield	Percentage	Bloomberg
FX Bond Yield	Percentage	Bloomberg
FX Hedge	Change in Currrency Futures in Percentage	Bloomberg
FX Regime	Score 1 to 4	Reinhart and Rogoff (2007)
FX Reserves to External Debt	Percentage	IMF IFS
GBI Weight	Percentage Share in the Index	JPM Indices
GDP Growth	Percentage YoY Change	IMF IFS
GDP Size	bn USD	IMF IFS
Government Debt	Percentage of GDP	IMF IFS
Issue Size	Log Local Currency	Bloomberg
LC Bond Yield	Percentage	Bloomberg
Maturity	Years	Bloomberg
Monetary Independence	Score 0 to 1	Chinn-Ito (2007)
Moody's Rating FC	Percentage	Moody's
Moody's Rating LC	Percentage	Moody's
Political Risk	Score 0 to 1	Economist Intelligence Unit
S&P Rating FC	Percentage	S&P
S&P Rating LC	Percentage	S&P
Trade Openness	Percentage of GDP	IMF IFS
VIX	Volatility in Percentage	Chicago Board Options Exchange Market
Holdings of Government Debt	Share of Total Local Currency Holdings by investor type	IMF Arsanalp and Tsuda (2012, 2013)

Table 2a Data Availability: Number of bond issues per currency

	CHF	DEM	EUR	FRF	GBP	ITL	JPY	USD	TOTAL
Developed Economies	39	45	41	19	47	6	62	192	451
Emerging Economies	9	4	67		5	3	50	187	325
Total	48	49	108	19	52	9	112	379	776

Table 2b: Data Availability Number of foreign currency yield observations per currency

	CHF	DEM	EUR	FRF	GBP	ITL	JPY	USD	TOTAL
Developed Economies	534	665	741	317	1284	90	916	3191	7738
Emerging Economies	60	55	1073		97	36	543	3355	5219
Total	594	720	1814	317	1381	126	1459	6546	12957

Table 3: Data Availability by Country

Country	Number of Foreign Currency Bond Issues	Number of observations: Spread between Foreign and Local Currency Yields	Number of observations: Spread between Foreign (USD-hedged) Yield and Local Currency Yield hedged into FX
Austria	59	986	157
Belgium	31	425	197
Brazil	33	416	0
Canada	22	468	400
Chile	8	96	38
Colombia	24	392	60
Denmark	60	780	626
Finland	33	453	83
Greece	20	205	138
Croatia	13	139	13
Hungary	28	474	384
Indonesia	18	338	286
Ireland	20	133	0
Israel	13	234	170
Italy	49	1023	288
Malaysia	6	124	56
Mexico	53	810	806
Poland	58	751	683
Philippines	30	746	721
Portugal	8	160	2
Russia	9	90	88
South Africa	2	4	0
Spain	29	575	145
Sweden	92	1192	958
Thailand	14	164	83
Turkey	44	826	793
Total	**776**	**12004**	**7175**

Table 4: Average Spread between FX-Yield hedged into USD and LC-Yield hedged into USD, by Maturity and Time Period

	Canada	Denmark	Sweden	Austria	Belgium	Finland	Greece	Ireland	Italy	Portugal	Spain
Period 1: 1996-2001											
<1Y	0.02	0.02	0.02	0.03	0.03	0.02					0.02
1-3Y	0.00	0.00	0.00	0.06	0.03	-0.01				-0.01	0.00
3-5Y	0.00	-0.01	0.01		0.02						0.03
5-7Y	-0.01	-0.04	0.00		0.01						0.16
7-10Y	0.06	-0.01	0.02		0.01				0.11		0.07
>10Y			-0.04		-0.02				-0.01		-0.08
Period 2: 2002-2007											
<1Y	0.01	0.01	0.01	0.02	0.02	0.02	0.06				
1-3Y	0.01	0.00	0.00				0.02				
3-5Y	0.02	0.00	-0.01				0.03				
5-7Y	0.07	0.01	-0.01								
7-10Y	0.11		-0.02								
>10Y			0.00								
Period 3: 2007-2013											
<1Y	0.02	0.01	0.01	0.00	0.00	0.00	0.08		0.01		0.01
1-3Y	0.01	0.00	0.01	0.00	0.01	-0.01	0.09		0.00	0.00	0.00
3-5Y	0.01	0.00	0.02	0.00	0.00	0.00	0.14		0.00		0.02
5-7Y	0.03		0.01	0.01	0.04	-0.01	0.10		0.03		0.09
7-10Y	0.02				0.00		0.10		0.03		0.10
>10Y			0.05	0.01	0.02				-0.01		-0.01

Table 5: Average spread between FX-Yield hedged into USD and unhedged LC-Yield, by Maturity and Time Period

	Canada	Denmark	Sweden	Austria	Finland	Belgium	Greece	Ireland	Italy	Portugal	Spain
Period 1: 1996-2001											
<1Y	0.02	0.03	0.03	0.03	0.03	0.03		0.03			0.03
1-3Y	0.00	0.01	0.02	0.03	0.04	0.04	0.01	0.03		0.05	0.04
3-5Y	0.01	0.02	0.03	0.04	0.04	0.04		0.04	0.02	0.02	0.06
5-7Y	0.00	0.02	0.02	0.08	0.06	0.02	0.03		0.14	0.01	0.18
7-10Y	0.07	0.05	0.05	0.10	0.02	0.01	0.01	0.03	0.15	0.28	0.09
>10Y	0.09		-0.02	0.09	0.00	0.00		-0.02	0.03	0.00	0.02
Period 2: 2002-2007											
<1Y	0.01	0.01	0.01	0.02	0.01	0.01	0.06	0.01	0.03	0.00	0.01
1-3Y	0.01	0.00	0.01	0.01	0.01	0.00	0.04	0.01	0.02	0.02	0.01
3-5Y	0.02	0.01	0.01	0.01	0.00	-0.01	0.03	0.00	0.02	0.05	0.01
5-7Y	0.03	0.01	-0.01	0.02	-0.04	-0.04	0.08	0.01	0.04		0.00
7-10Y	0.11		-0.04	0.01	-0.03				0.04	-0.01	0.00
>10Y			-0.03	0.05		-0.02			0.02	-0.03	-0.03
Period 3: 2007-2013											
<1Y	0.01	0.00	0.00	0.01	0.01	0.01	0.08	0.01	0.01		0.01
1-3Y	-0.01	0.00	-0.01	0.00	0.00	0.01	0.09	-0.01	0.00	0.01	0.00
3-5Y	-0.01	0.00	-0.01	0.00	0.00	0.00	0.15		0.00	-0.01	0.02
5-7Y	0.00		0.00	0.00	0.00	0.04	0.12		0.03	0.00	0.09
7-10Y	0.01			-0.02		-0.01	0.12		0.04	-0.03	0.12
>10Y			0.02	0.01		0.00			0.00		-0.01

Table 6: Average Spread between FX-Yield hedged into USD and LC-Yield hedged into USD, by Maturity and Time Period

	Brazil	Chile	Colombia	Croatia	Hungary	Indonesia	Israel	Malaysia	Mexico	Poland	Philippines	Russia	South Africa	Thailand	Turkey
Period 1: 1996-2001															
<1Y										0.01				0.06	
1-3Y											0.12			0.08	
3-5Y											0.13			0.11	
5-7Y											0.41			0.12	
7-10Y											0.31			0.19	
>10Y											0.31				
Period 2: 2002-2007															
<1Y	0.02	0.02		0.02	0.02	0.08	0.01	0.02	0.00	0.04	0.02			0.02	0.01
1-3Y		0.01		0.06		0.01	-0.01	0.05	0.03	0.05	0.00			0.04	0.08
3-5Y				0.08		0.01	-0.02	0.08	0.04	0.09	0.02			0.04	0.15
5-7Y				0.18	0.12	0.02		0.20	0.08	0.26				0.08	0.36
7-10Y				0.18	0.12	0.04		0.23	0.12	0.19					0.37
>10Y					0.11	0.03		0.15		0.20	0.07				0.36
Period 3: 2007-2013															
<1Y	0.00	0.00	0.01	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.02			0.05	0.01
1-3Y	0.02	0.02	0.06	0.08	0.08	0.01	0.01	0.05	0.03	0.02	0.12			0.04	0.08
3-5Y	0.01			0.10	0.10	0.01	0.02	0.07	0.05	0.03	0.09			0.05	0.12
5-7Y				0.20	0.23	0.04		0.16	0.12	0.10	0.21				0.27
7-10Y	0.15			0.22	0.24	0.04	0.06	0.17	0.12	0.11	0.22				0.28
>10Y	0.17			0.18	0.21	0.04		0.16	0.17	0.07	0.22				0.29

Table 7: Average spread between FX-Yield hedged into USD and unhedged LC-Yield, by Maturity and Time Period

	Brazil	Chile	Colombia	Croatia	Hungary	Indonesia	Israel	Malaysia	Mexico	Poland	Philippines	Russia	South Africa	Thailand	Turkey
Period 1: 1996-2001															
<1Y										-0.06				0.04	
1-3Y					-0.04					-0.06	-0.05			0.03	
3-5Y					-0.01			0.03		-0.05	-0.04			0.04	
5-7Y					-0.02					-0.05	-0.07			0.01	
7-10Y					0.04			0.03		-0.01	-0.07			0.04	
>10Y											-0.09				
Period 2: 2002-2007															
<1Y	0.00	0.02	0.01	0.01	-0.01	-0.02	0.08	0.02	0.00	-0.02	0.03	0.02		0.01	-0.05
1-3Y	-0.06	-0.01	-0.02	0.02	-0.02	-0.05	0.02	0.00	-0.03	0.01	-0.03	0.00		0.03	-0.11
3-5Y	-0.06	-0.01	-0.03	0.01	0.01		0.00	0.01	-0.04	0.02	-0.03	-0.01		0.03	-0.09
5-7Y	-0.05	-0.01	-0.02	0.02	0.05	-0.03	0.00	0.01	-0.03	0.05	-0.03			0.11	-0.08
7-10Y		-0.01	-0.03	0.04	-0.01	-0.05	0.01	0.01	-0.03	0.00	-0.02			0.00	-0.08
>10Y			-0.03			-0.07	0.00		-0.06		-0.04	-0.01			-0.08
Period 3: 2007-2013															
<1Y	-0.05	-0.02	-0.02	0.00	0.00	-0.03	0.01	0.00	-0.01	0.00	0.00	0.00		0.04	-0.04
1-3Y	-0.09	-0.03	-0.04	-0.01	-0.02	-0.03	-0.01	-0.01	-0.04	-0.02	-0.02	-0.05		0.02	-0.09
3-5Y	-0.09	-0.02	-0.04	-0.01	-0.02	-0.04	-0.01	-0.01	-0.03	-0.01	-0.02	-0.04		0.03	-0.07
5-7Y	-0.08		-0.03	0.00	0.02	-0.03	0.00		-0.02	0.01	-0.01	-0.04		0.14	-0.06
7-10Y	-0.08	-0.03	-0.02	0.00	0.02	-0.01	0.00	0.00	-0.01	0.02	-0.01	-0.04	0.01		-0.05
>10Y	-0.07	-0.01	-0.02		0.00	-0.05	0.00		-0.03	0.05	-0.03	-0.03			-0.05

Table 9: Determinants of Government Bond Yields: Maturities 1Y to 5Y

	(1) LC Yld EM	(2) LC Yld DM	(3) LC-Hedge Yld EM	(4) LC-Hedge Yld DM	(5) FC-Hedge Yld EM	(6) FC-Hedge Yld DM	(7) FCH-LCH Spr EM	(8) FCH-LCH Spr DM
Political Risk	-0.00	0.03	0.13**	-0.03	0.02*	0.38***	0.11***	0.53***
	(-0.04)	(1.55)	(2.01)	(-0.96)	(1.67)	(5.20)	(2.74)	(4.71)
S&P Rating LC	-0.19***	-0.37***	-0.84***	-0.45***	-0.01	-0.71***	-0.22***	-0.38***
	(-9.54)	(-9.16)	(-8.51)	(-8.63)	(-0.64)	(-6.64)	(-3.12)	(-4.29)
Maturity_squared	-0.00	-0.00	-0.01***	-0.00**	-0.00***	-0.00**	-0.01***	-0.01***
	(-0.20)	(-0.81)	(-4.18)	(-2.11)	(-3.74)	(-2.53)	(-6.97)	(-3.06)
Maturity	0.00	0.00**	0.05***	0.01***	0.01***	0.02***	0.06***	0.04***
	(1.37)	(2.08)	(6.73)	(3.42)	(7.41)	(3.65)	(10.56)	(3.87)
Issue Size	-0.00**	0.00	-0.00	0.00	-0.00	0.00	0.00	0.00
	(-2.57)	(0.48)	(-0.79)	(1.08)	(-0.11)	(0.30)	(0.36)	(0.86)
Debt to GDP	0.06***	-0.00	0.40***	-0.01	0.01	-0.16***	0.14**	-0.34***
	(3.61)	(-0.16)	(5.30)	(-0.25)	(0.83)	(-3.52)	(2.43)	(-3.80)
FX Reserves to External Debt	0.02***	-0.00	0.02	-0.14	-0.00	0.07	-0.02	-0.09
	(2.58)	(-0.06)	(0.71)	(-1.32)	(-0.03)	(0.72)	(-1.43)	(-0.39)
Debt Servicing Cost	0.01	-0.01	0.38***	-0.15***	0.04**	-0.01	0.20**	-0.17
	(0.59)	(-0.58)	(3.35)	(-3.14)	(2.41)	(-0.33)	(2.50)	(-1.07)
External Debt	0.02***	0.00*	0.04***	0.01***	-0.01**	0.00***	0.01	0.00
	(6.20)	(1.94)	(2.91)	(4.58)	(-2.55)	(2.82)	(0.69)	(0.04)
CPI	0.41***	-0.08	1.36***	-0.45***	0.00	-0.74***	0.49***	-1.27***
	(11.20)	(-1.04)	(8.76)	(-3.63)	(0.21)	(-4.67)	(4.42)	(-5.03)
Current Account Balance	-0.13***	-0.31***	-0.23	-0.53***	0.02	-0.44***	0.06	-0.31**
	(-4.07)	(-7.35)	(-1.63)	(-7.61)	(0.86)	(-5.36)	(0.53)	(-2.29)
GDP Size	0.04***	0.04**	0.06**	0.06*	-0.02***	0.09***	0.01	0.04
	(7.15)	(2.26)	(2.06)	(1.78)	(-3.92)	(3.59)	(0.63)	(0.89)
VIX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
R-squared	0.87	0.82	0.84	0.90	0.84	0.66	0.64	0.60
Nb of Observations	1351	1530	980	811	1310	1346	940	739
Nb of Bonds	147	162	120	107	140	145	113	97
Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y

t statistics in parentheses

Note: Full Sample with Maturities 1Y to 5Y. Standard-errors are adjusted for heteroskedasticity, contemporaneous cross-panel correlation and first-order autocorrelation.

* p<.10, ** p<.05, *** p<.01

Table 10: Determinants of Government Bond Yields: Common sample and Maturities 1Y to 5Y

	(1) LC Yld EM	(2) LC Yld DM	(3) LC-Hedge Yld EM	(4) LC-Hedge Yld DM	(5) FC-Hedge Yld EM	(6) FC-Hedge Yld DM	(7) FCH-LCH Spr EM	(8) FCH-LCH Spr DM
Political Risk	0.03	0.05**	0.13**	0.03	0.03	0.59***	0.11***	0.53***
	(1.34)	(2.40)	(2.00)	(1.21)	(1.55)	(5.24)	(2.74)	(4.71)
S&P Rating LC	-0.31***	-0.28***	-0.84***	-0.30***	-0.00	-0.64***	-0.22***	-0.38***
	(-10.92)	(-11.51)	(-8.52)	(-8.69)	(-0.17)	(-7.56)	(-3.12)	(-4.29)
Maturity_squared	-0.00	-0.00	-0.01***	-0.00	-0.00***	-0.01***	-0.01***	-0.01***
	(-0.32)	(-0.25)	(-4.03)	(-1.60)	(-4.06)	(-2.66)	(-6.97)	(-3.06)
Maturity	0.00	0.00	0.05***	0.01***	0.01***	0.04***	0.06***	0.04***
	(1.19)	(1.56)	(6.52)	(3.04)	(6.95)	(3.37)	(10.56)	(3.87)
Issue Size	-0.00*	-0.00	-0.00	0.00	0.00	0.00	0.00	0.00
	(-1.65)	(-0.09)	(-0.86)	(0.58)	(0.30)	(0.62)	(0.36)	(0.86)
Debt to GDP	0.12***	0.02	0.39***	-0.01	-0.01	-0.29***	0.14**	-0.34***
	(5.31)	(0.82)	(5.04)	(-0.28)	(-0.30)	(-3.65)	(2.43)	(-3.80)
FX Reserves to External Debt	0.02	-0.04	0.02	-0.23**	-0.01	0.05	-0.02	-0.09
	(1.64)	(-0.66)	(0.59)	(-2.16)	(-1.43)	(0.22)	(-1.43)	(-0.39)
Debt Servicing Cost	0.11***	0.02	0.37***	-0.11**	0.04**	-0.02	0.20**	-0.17
	(3.14)	(0.66)	(3.16)	(-2.39)	(2.31)	(-0.10)	(2.50)	(-1.07)
External Debt	0.01**	0.00	0.03**	0.01***	-0.01***	-0.01	0.01	0.00
	(2.34)	(1.07)	(2.54)	(4.20)	(-3.01)	(-1.51)	(0.69)	(0.04)
CPI	0.45***	-0.16***	1.36***	-0.47***	0.05**	-1.11***	0.49***	-1.27***
	(10.52)	(-2.84)	(8.65)	(-4.09)	(2.28)	(-4.70)	(4.42)	(-5.03)
Current Account Balance	-0.13***	-0.30***	-0.25*	-0.40***	0.05**	-0.51***	0.06	-0.31**
	(-3.54)	(-8.40)	(-1.74)	(-6.87)	(2.23)	(-3.93)	(0.53)	(-2.29)
GDP Size	0.01	-0.02*	0.06**	0.01	-0.03***	-0.03	0.01	0.04
	(0.91)	(-1.90)	(2.01)	(0.47)	(-4.47)	(-0.69)	(0.63)	(0.89)
VIX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
R-squared	0.89	0.92	0.84	0.91	0.85	0.73	0.64	0.60
Nb of Observations	940	739	940	739	940	739	940	739
Nb of Bonds	113	97	113	97	113	97	113	97
Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y

t statistics in parentheses

Note: Common Sample, Maturities 1Y to 5Y. Standard-errors are adjusted for heteroskedasticity, contemporaneous cross-panel correlation and first-order autocorrelation.

* p<.10, ** p<.05, *** p<.01

Table 11: Determinants of Government Bond Yields in Local and Foreign Currencies: Bonds with Non-Investment Rating

	(1) LC Yld EM	(2) LC Yld DM	(3) LC-Hedge Yld EM	(4) LC-Hedge Yld DM	(5) FC-Hedge Yld EM	(6) FC-Hedge Yld DM	(7) FCH-LCH Spr EM	(8) FCH-LCH Spr DM
Political Risk	-0.27***	-0.13***	-0.40	-0.23***	0.06	3.11***	0.23	3.13***
	(-4.07)	(-9.41)	(-1.54)	(-3.12)	(1.25)	(5.33)	(0.84)	(4.84)
S&P Rating LC	0.52***	-0.67***	0.43	-0.84***	0.19***	0.09	-0.45	0.59***
	(7.52)	(-115.79)	(1.42)	(-15.96)	(3.33)	(0.56)	(-1.43)	(3.02)
Maturity_squared	-0.00***	0.00*	-0.01***	-0.01***	-0.00*	-0.03***	-0.01***	-0.04***
	(-4.98)	(1.89)	(-8.74)	(-7.24)	(-1.88)	(-3.22)	(-6.66)	(-4.44)
Maturity	0.01***	-0.00	0.10***	0.07***	0.01***	0.16***	0.09***	0.23***
	(5.08)	(-0.51)	(11.90)	(9.71)	(4.21)	(3.37)	(10.02)	(5.08)
Issue Size	-0.00	0.02***	0.01	0.02***	0.00	-0.12	0.01	-0.14
	(-1.10)	(3.53)	(0.79)	(2.88)	(0.76)	(-0.58)	(1.33)	(-0.76)
Debt to GDP	0.40***	0.07***	0.55	0.11**	0.10	0.33**	-0.17	0.29*
	(5.11)	(13.56)	(1.57)	(1.98)	(1.60)	(2.44)	(-0.48)	(1.75)
FX Reserves to External Debt	0.02	0.00	-0.08	0.00	-0.01	0.00	-0.13	0.00
	(0.68)	(.)	(-0.76)	(.)	(-0.29)	(.)	(-1.05)	(.)
Debt Servicing Cost	-0.20***	0.00	-0.75***	0.00	-0.01	0.00	-0.34	0.00
	(-2.99)	(.)	(-3.01)	(.)	(-0.20)	(.)	(-1.22)	(.)
External Debt	0.02	-0.02***	-0.03	-0.01**	0.00	-0.20***	-0.06**	-0.16**
	(1.46)	(-14.56)	(-1.02)	(-2.19)	(0.14)	(-3.07)	(-2.00)	(-2.43)
CPI	0.01	0.00	0.37*	0.00	0.15***	0.00	0.54**	0.00
	(0.12)	(.)	(1.76)	(.)	(4.09)	(.)	(2.50)	(.)
Current Account Balance	-0.20***	-0.95***	-0.44**	-1.01***	-0.00	-3.01***	-0.01	-2.15**
	(-4.37)	(-40.74)	(-2.33)	(-5.37)	(-0.03)	(-3.73)	(-0.03)	(-2.36)
GDP Size	-0.07**	0.01	-0.09	-0.01	0.02	0.15	0.09	0.12
	(-2.28)	(1.23)	(-0.82)	(-0.36)	(1.07)	(0.40)	(0.76)	(0.40)
VIX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
R-squared	0.99	1.00	0.96	0.94	0.92	0.84	0.80	0.73
Nb of Observations	328	128	328	128	328	128	328	128
Nb of Bonds	36	24	36	24	36	24	36	24
Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y

t statistics in parentheses

Note:Common sample and Maturities 1Y to 5Y. Standard-errors are adjusted for heteroskedasticity, contemporaneous cross-panel correlation and first-order autocorrelation.

* p<.10, ** p<.05, *** p<.01

Table 12: Determinants of Government Bond Yields: Bonds with Investment Rating

	(1) LC Yld EM	(2) LC Yld DM	(3) LC-Hedge Yld EM	(4) LC-Hedge Yld DM	(5) FC-Hedge Yld EM	(6) FC-Hedge Yld DM	(7) FCH-LCH Spr EM	(8) FCH-LCH Spr DM
Political Risk	0.03*	0.03**	0.23***	0.03	0.02	0.02	0.20***	-0.01
	(1.93)	(2.56)	(3.94)	(1.41)	(1.00)	(1.48)	(4.39)	(-0.28)
S&P Rating LC	-0.02	-0.16***	-0.09	-0.19***	0.02	-0.18***	-0.03	-0.03
	(-0.74)	(-9.20)	(-0.63)	(-6.06)	(0.83)	(-8.24)	(-0.24)	(-0.90)
Maturity_squared	-0.00	-0.00	-0.00***	0.00*	-0.00***	-0.00	-0.00***	0.00
	(-0.77)	(-0.06)	(-3.40)	(1.83)	(-4.13)	(-1.22)	(-5.47)	(0.88)
Maturity	0.00**	0.00*	0.03***	-0.00	0.01***	0.01***	0.04***	0.00
	(2.19)	(1.71)	(5.04)	(-0.96)	(6.19)	(3.42)	(7.49)	(0.01)
Issue Size	0.00	-0.00	0.00	0.00	0.00	0.00	-0.00	0.00**
	(1.09)	(-1.01)	(0.15)	(0.61)	(0.08)	(1.31)	(-0.32)	(2.53)
Debt to GDP	-0.01	0.00	0.08	-0.02	0.01	0.00	0.10	-0.01
	(-0.27)	(0.16)	(0.88)	(-0.55)	(0.28)	(0.16)	(1.37)	(-0.29)
FX Reserves to External Debt	-0.01**	-0.09**	-0.08***	-0.29***	-0.00	0.00	-0.05***	-0.11
	(-2.37)	(-2.45)	(-3.07)	(-3.34)	(-0.20)	(0.05)	(-2.80)	(-1.37)
Debt Servicing Cost	0.06*	0.01	0.40**	0.04	0.01	-0.02	0.30**	0.01
	(1.66)	(0.51)	(2.41)	(1.22)	(0.30)	(-0.78)	(2.35)	(0.36)
External Debt	0.01***	0.00*	0.02	0.00	-0.01***	0.00**	-0.01	0.00
	(3.44)	(1.82)	(1.48)	(0.56)	(-2.87)	(2.29)	(-0.96)	(0.16)
CPI	0.15***	-0.21***	0.62***	-0.41***	0.04	-0.22***	0.37**	-0.22*
	(3.22)	(-4.97)	(2.68)	(-3.33)	(0.97)	(-3.32)	(2.00)	(-1.71)
Current Account Balance	-0.16***	-0.08***	-0.31*	-0.22***	0.00	-0.01	0.02	-0.05
	(-4.72)	(-3.77)	(-1.69)	(-4.62)	(0.04)	(-0.26)	(0.14)	(-1.07)
GDP Size	0.01	-0.01	0.05	0.01	-0.03***	0.01	-0.00	0.02
	(1.38)	(-0.63)	(1.44)	(0.20)	(-4.76)	(0.37)	(-0.08)	(0.79)
VIX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
R-squared	0.87	0.92	0.71	0.93	0.85	0.89	0.55	0.78
Nb of Observations	605.00	610.00	605.00	610.00	605.00	610.00	605.00	610.00
Nb of Bonds	73.00	81.00	73.00	81.00	73.00	81.00	73.00	81.00
Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y

t statistics in parentheses

Note:Common sample and Maturities 1Y to 5Y. Standard-errors are adjusted for heteroskedasticity, contemporaneous cross-panel correlation and first-order autocorrelation.

* p<.10, ** p<.05, *** p<.01

Table 13: Determinants of Government Bond Yields: Share of Local Currency Debt above 83%

	(1) LC Yld EM	(2) LC Yld DM	(3) LC-Hedge Yld EM	(4) LC-Hedge Yld DM	(5) FC-Hedge Yld EM	(6) FC-Hedge Yld DM	(7) FCH-LCH Spr EM	(8) FCH-LCH Spr DM
Political Risk	0.12***	0.05*	0.20**	0.03	0.08***	0.52***	0.03	0.44***
	(4.26)	(1.73)	(2.23)	(1.10)	(2.95)	(4.68)	(0.58)	(3.97)
S&P Rating LC	-0.51***	-0.28***	-1.14***	-0.29***	-0.07***	-0.62***	-0.20**	-0.37***
	(-14.80)	(-8.32)	(-9.91)	(-7.94)	(-2.61)	(-6.31)	(-2.52)	(-3.58)
Maturity_squared	-0.00	-0.00	-0.01***	0.00	-0.00***	-0.01***	-0.01***	-0.01**
	(-0.57)	(-0.74)	(-4.31)	(0.06)	(-3.34)	(-2.77)	(-6.65)	(-2.57)
Maturity	0.00	0.00**	0.05***	0.00	0.01***	0.04***	0.06***	0.04***
	(1.15)	(2.31)	(6.55)	(0.81)	(5.82)	(3.26)	(10.15)	(2.72)
Issue Size	-0.00	0.00	-0.00	0.00	0.00	0.00	0.00	-0.00
	(-1.37)	(0.43)	(-0.23)	(0.46)	(0.43)	(0.02)	(0.90)	(-0.04)
Debt to GDP	0.23***	-0.00	0.43***	-0.00	-0.00	-0.42***	-0.03	-0.43***
	(6.91)	(-0.03)	(3.90)	(-0.05)	(-0.11)	(-4.31)	(-0.47)	(-4.16)
FX Reserves to External Debt	0.02**	0.04	0.03	-0.12	0.00	0.04	-0.01	-0.18
	(2.22)	(0.53)	(1.04)	(-1.27)	(0.23)	(0.12)	(-0.74)	(-0.62)
Debt Servicing Cost	0.51***	-0.12***	1.20***	-0.09**	0.23***	-0.29*	0.44***	-0.12
	(9.12)	(-3.28)	(6.93)	(-2.22)	(5.56)	(-1.84)	(3.96)	(-0.82)
External Debt	0.02***	0.01***	0.08***	0.01***	-0.01	0.02***	0.03***	0.01*
	(3.52)	(4.76)	(4.28)	(3.41)	(-1.10)	(3.37)	(2.70)	(1.66)
CPI	0.59***	-0.09	1.43***	-0.11	0.07**	-2.46***	0.35***	-2.46***
	(11.80)	(-0.72)	(8.48)	(-0.78)	(1.97)	(-4.59)	(3.25)	(-4.58)
Current Account Balance	-0.31***	-0.18***	-0.58***	-0.23***	0.03	-0.27	0.07	-0.13
	(-6.35)	(-3.72)	(-3.88)	(-4.37)	(0.88)	(-1.16)	(0.77)	(-0.58)
GDP Size	-0.01	0.02	0.05	0.04	0.00	-0.05	0.07*	-0.04
	(-0.64)	(0.63)	(0.92)	(1.26)	(0.01)	(-0.93)	(1.92)	(-0.73)
VIX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
R-squared	0.96	0.93	0.93	0.90	0.88	0.76	0.78	0.63
Nb of Observations	626	545	626	545	626	545	626	545
Nb of Bonds	80	79	80	79	80	79	80	79
Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y

t statistics in parentheses
Note: Common sample and Maturities 1Y to 5Y. Standard-errors are adjusted for heteroskedasticity, contemporaneous cross-panel correlation and first-order autocorrelation.
* p<.10, ** p<.05, *** p<.01

Table 14: Determinants of Government Bond Yields: Share of Local Currency Debt below 83%

	(1) LC Yld EM	(2) LC Yld DM	(3) LC-Hedge Yld EM	(4) LC-Hedge Yld DM	(5) FC-Hedge Yld EM	(6) FC-Hedge Yld DM	(7) FCH-LCH Spr EM	(8) FCH-LCH Spr DM
Political Risk	-0.01	0.00	0.34*	0.00	0.01	0.00	0.36**	0.00
	(-0.25)	(.)	(1.85)	(.)	(0.58)	(.)	(2.42)	(.)
S&P Rating LC	-0.39***	0.00	-1.41***	0.00	0.04	0.00	-0.55**	0.00
	(-6.10)	(.)	(-4.97)	(.)	(1.23)	(.)	(-2.38)	(.)
Maturity_squared	-0.00**	-0.00***	-0.01***	-0.01***	-0.00**	-0.00*	-0.01***	-0.01***
	(-2.50)	(-5.01)	(-6.17)	(-6.42)	(-2.05)	(-1.90)	(-5.35)	(-5.10)
Maturity	0.01***	0.00***	0.08***	0.06***	0.01***	0.01***	0.07***	0.07***
	(3.39)	(6.07)	(8.02)	(8.87)	(4.54)	(3.68)	(7.17)	(7.64)
Issue Size	-0.00	-0.00***	-0.00	0.00	0.00	-0.00	0.00	0.00
	(-1.10)	(-3.29)	(-0.27)	(0.01)	(1.14)	(-1.01)	(0.32)	(0.24)
Debt to GDP	0.16**	0.00	0.66**	0.00	-0.01	0.00	0.29	0.00
	(2.24)	(.)	(2.23)	(.)	(-0.38)	(.)	(1.27)	(.)
FX Reserves to External Debt	-0.11***	0.00	-0.36***	0.00	-0.03**	0.00	-0.16*	0.00
	(-4.83)	(.)	(-3.31)	(.)	(-2.53)	(.)	(-1.72)	(.)
Debt Servicing Cost	-0.12*	0.00	0.14	0.00	-0.05	0.00	0.29	0.00
	(-1.67)	(.)	(0.46)	(.)	(-1.31)	(.)	(1.26)	(.)
External Debt	-0.05***	0.00	-0.18***	-0.02***	0.02***	0.00***	-0.07*	-0.00
	(-4.54)	(1.25)	(-3.79)	(-10.76)	(4.04)	(3.90)	(-1.89)	(-1.25)
CPI	0.34***	0.00	1.57***	0.00	0.07**	0.00	0.87***	0.00
	(5.64)	(.)	(5.28)	(.)	(2.21)	(.)	(3.52)	(.)
Current Account Balance	-0.19***	0.00	-0.32	0.00	-0.02	0.00	0.06	0.00
	(-3.04)	(.)	(-1.12)	(.)	(-0.48)	(.)	(0.24)	(.)
GDP Size	0.00	0.02***	0.07	0.02	-0.00	0.01	0.06	-0.01
	(0.23)	(6.80)	(0.99)	(1.37)	(-0.43)	(1.04)	(0.96)	(-0.32)
VIX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
R-squared	0.97	0.99	0.93	0.92	0.93	0.90	0.75	0.77
Nb of Observations	314	194	314	194	314	194	314	194
Nb of Bonds	67	18	67	18	67	18	67	18
Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y

t statistics in parentheses
Note: Common sample and Maturities 1Y to 5Y. Standard-errors are adjusted for heteroskedasticity, contemporaneous cross-panel correlation and first-order autocorrelation.
* p<.10, ** p<.05, *** p<.01

Table 15: Determinants of Government Bond Yields in Local and Foreign Currencies: Debt held by foreign investors above 40%

	(1) LC Yld EM	(2) LC Yld DM	(3) LC-Hedge Yld EM	(4) LC-Hedge Yld DM	(5) FC-Hedge Yld EM	(6) FC-Hedge Yld DM	(7) FCH-LCH Spr EM	(8) FCH-LCH Spr DM
Political Risk	0.14***	-0.01	0.41***	-0.01	0.07*	0.45***	0.19**	0.47***
	(7.31)	(-0.57)	(5.50)	(-0.45)	(1.89)	(4.62)	(2.50)	(4.50)
S&P Rating LC	0.00	-0.29***	0.00	-0.32***	0.00	-0.74***	0.00	-0.48***
	(.)	(-11.55)	(.)	(-7.47)	(.)	(-7.61)	(.)	(-4.44)
Maturity_squared	-0.00	0.00	-0.00***	-0.00	-0.00	-0.00**	-0.00***	-0.01***
	(-1.25)	(0.69)	(-3.51)	(-1.63)	(-1.53)	(-2.44)	(-3.01)	(-2.99)
Maturity	0.00***	0.00	0.03***	0.01***	0.01***	0.03***	0.02***	0.04***
	(3.33)	(0.82)	(6.45)	(3.27)	(3.28)	(3.17)	(5.32)	(3.83)
Issue Size	-0.00	-0.00	-0.00	-0.00	-0.00**	0.00	-0.00	0.00
	(-0.53)	(-0.68)	(-0.04)	(-0.06)	(-2.06)	(0.62)	(-1.12)	(0.81)
Debt to GDP	0.10***	0.08***	0.46***	-0.00	-0.01	-0.17*	0.24**	-0.35***
	(3.37)	(2.68)	(4.27)	(-0.02)	(-0.23)	(-1.87)	(2.10)	(-3.24)
FX Reserves to External Debt	-0.04**	-0.11	-0.03	-0.49***	-0.00	0.11	0.03	-0.13
	(-2.12)	(-1.55)	(-0.54)	(-3.48)	(-0.16)	(0.65)	(0.64)	(-0.55)
Debt Servicing Cost	-0.10**	0.01	-0.36**	-0.13***	0.01	0.06	-0.11	-0.15
	(-2.32)	(0.30)	(-2.20)	(-2.64)	(0.28)	(0.42)	(-0.72)	(-0.99)
External Debt	-0.01*	-0.00*	-0.00	0.01**	-0.02***	-0.02***	-0.01	-0.00
	(-1.93)	(-1.72)	(-0.32)	(1.97)	(-3.09)	(-3.02)	(-0.55)	(-0.87)
CPI	-0.00	-0.13**	-0.40**	-0.60***	0.03	-0.70***	-0.29*	-1.07***
	(-0.11)	(-2.11)	(-2.35)	(-4.49)	(0.54)	(-4.05)	(-1.71)	(-4.86)
Current Account Balance	-0.03	-0.32***	-0.03	-0.51***	0.01	-0.47***	0.10	-0.40**
	(-1.00)	(-8.73)	(-0.28)	(-8.04)	(0.18)	(-2.90)	(0.85)	(-2.26)
GDP Size	-0.07***	-0.05***	-0.21***	-0.04	-0.05***	-0.05	-0.10***	0.03
	(-6.86)	(-3.85)	(-5.59)	(-1.04)	(-3.55)	(-1.01)	(-2.67)	(0.58)
VIX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
R-squared	0.93	0.94	0.95	0.92	0.91	0.77	0.83	0.63
Nb of Observations	300	646	300	646	300	646	300	646
Nb of Bonds	50	87	50	87	50	87	50	87
Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y

t statistics in parentheses
Note: Common sample and Maturities 1Y to 5Y. Standard-errors are adjusted for heteroskedasticity, contemporaneous cross-panel correlation and first-order autocorrelation.
* p<.10, ** p<.05, *** p<.01

Table 16: Determinants of Government Bond Yields in Local and Foreign Currencies: Debt held by foreign investors below 40%

	(1) LC Yld EM	(2) LC Yld DM	(3) LC-Hedge Yld EM	(4) LC-Hedge Yld DM	(5) FC-Hedge Yld EM	(6) FC-Hedge Yld DM	(7) FCH-LCH Spr EM	(8) FCH-LCH Spr DM
Political Risk	0.10***	0.33***	0.40***	0.29***	0.03	0.21***	0.22***	-0.19
	(3.46)	(5.57)	(4.15)	(2.82)	(1.25)	(2.84)	(3.62)	(-0.97)
S&P Rating LC	-0.35***	-0.06*	-0.99***	-0.04	0.01	-0.11	-0.27***	-0.02
	(-10.67)	(-1.69)	(-8.65)	(-0.65)	(0.67)	(-1.62)	(-3.18)	(-0.15)
Maturity_squared	-0.00	-0.00**	-0.01***	0.00*	-0.00***	-0.00	-0.01***	0.00
	(-0.40)	(-2.30)	(-3.81)	(1.84)	(-3.89)	(-1.33)	(-6.21)	(1.35)
Maturity	0.00	0.01***	0.06***	-0.00	0.01***	0.01***	0.07***	-0.01
	(0.87)	(4.22)	(6.08)	(-0.49)	(6.45)	(3.00)	(9.61)	(-1.15)
Issue Size	-0.00	0.00	-0.00	0.00**	0.00	0.00	0.00	0.00
	(-1.35)	(0.38)	(-0.81)	(2.01)	(0.61)	(0.61)	(0.27)	(0.80)
Debt to GDP	0.25***	-0.22***	0.72***	-0.19***	0.02	-0.13***	0.24***	0.11
	(7.74)	(-7.34)	(6.63)	(-4.12)	(1.09)	(-4.33)	(3.12)	(1.16)
FX Reserves to External Debt	-0.03***	6.30***	-0.12***	6.80**	-0.02**	2.70	-0.08***	-3.59
	(-3.03)	(3.98)	(-3.44)	(2.50)	(-2.37)	(1.37)	(-3.40)	(-0.66)
Debt Servicing Cost	0.10**	-1.90***	0.35**	-1.04	0.03	-1.80***	0.19	1.06
	(2.08)	(-3.68)	(2.13)	(-1.21)	(1.04)	(-3.69)	(1.61)	(0.55)
External Debt	0.02***	0.04*	0.06**	0.07**	0.00	-0.01	0.02	-0.02
	(2.99)	(1.96)	(2.43)	(2.44)	(0.52)	(-0.89)	(1.19)	(-0.29)
CPI	0.57***	0.80**	1.75***	1.27**	0.11***	0.12	0.70***	-0.27
	(10.94)	(2.53)	(9.01)	(2.41)	(3.67)	(0.27)	(4.89)	(-0.26)
Current Account Balance	-0.16***	-1.47***	-0.44**	-1.03***	0.04*	-0.66**	-0.07	1.31*
	(-3.09)	(-6.56)	(-2.22)	(-2.66)	(1.74)	(-2.14)	(-0.48)	(1.66)
GDP Size	0.01	0.18*	0.05	0.51***	-0.01	0.02	0.01	0.14
	(1.24)	(1.93)	(1.38)	(3.27)	(-1.54)	(0.30)	(0.50)	(0.45)
VIX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
R-squared	0.91	0.98	0.86	0.99	0.85	0.96	0.66	0.87
Nb of Observations	640	93	640	93	640	93	640	93
Nb of Bonds	82	23	82	23	82	23	82	23
Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y

t statistics in parentheses

Note: Common sample and Maturities 1Y to 5Y. Standard-errors are adjusted for heteroskedasticity, contemporaneous cross-panel correlation and first-order autocorrelation.

* p<.10, ** p<.05, *** p<.01

Table 17: Determinants of Government Bond Yields in Local and Foreign Currencies: Debt held by foreign investors above 40% and Local Currency Debt above 83%

	(1) LC Yld EM	(2) LC Yld DM	(3) LC-Hedge Yld EM	(4) LC-Hedge Yld DM	(5) FC-Hedge Yld EM	(6) FC-Hedge Yld DM	(7) FCH-LCH Spr EM	(8) FCH-LCH Spr DM
Political Risk	0.21***	0.32***	0.33***	0.32***	0.10***	0.23***	0.08	-0.09
	(6.43)	(5.77)	(3.22)	(4.18)	(3.21)	(3.08)	(1.13)	(-0.99)
S&P Rating LC	-0.77***	-0.06*	-1.60***	-0.04	-0.09***	-0.11	-0.21*	-0.02
	(-17.79)	(-1.87)	(-11.27)	(-1.16)	(-2.58)	(-1.58)	(-1.91)	(-0.24)
Maturity_squared	-0.00**	-0.00**	-0.01***	0.00	-0.00***	-0.00**	-0.01***	0.00
	(-2.07)	(-2.28)	(-5.13)	(1.34)	(-3.11)	(-2.35)	(-5.83)	(0.11)
Maturity	0.00**	0.01***	0.06***	0.00	0.01***	0.01***	0.07***	-0.00
	(2.21)	(6.21)	(7.29)	(0.55)	(5.25)	(4.09)	(9.03)	(-0.28)
Issue Size	0.00	0.00***	0.00	0.00**	0.00	-0.00	0.00	-0.00***
	(0.50)	(3.34)	(0.94)	(2.10)	(0.79)	(-0.49)	(1.19)	(-2.62)
Debt to GDP	0.42***	-0.21***	0.86***	-0.20***	0.02	-0.13***	0.07	0.09**
	(11.21)	(-9.21)	(6.79)	(-5.95)	(0.53)	(-4.21)	(0.77)	(2.24)
FX Reserves to External Debt	-0.01	5.70***	-0.09***	7.99***	-0.01	3.29*	-0.08***	-0.00
	(-1.23)	(3.91)	(-2.95)	(4.50)	(-1.04)	(1.68)	(-3.27)	(-0.00)
Debt Servicing Cost	0.40***	-1.62***	0.39*	-1.57***	0.26***	-2.00***	-0.02	-0.36
	(6.01)	(-5.61)	(1.86)	(-2.75)	(4.69)	(-4.17)	(-0.13)	(-0.49)
External Debt	0.05***	0.03**	0.23***	0.08***	-0.00	-0.01	0.12***	0.01
	(5.74)	(2.32)	(7.09)	(3.73)	(-0.17)	(-0.53)	(4.78)	(0.56)
CPI	0.95***	0.83***	2.42***	1.24***	0.09**	0.15	0.66***	-0.25
	(19.67)	(2.64)	(14.18)	(3.60)	(2.14)	(0.33)	(5.33)	(-0.45)
Current Account Balance	-0.75***	-1.42***	-1.63***	-1.15***	0.07	-0.73**	-0.06	0.94**
	(-10.66)	(-6.70)	(-7.27)	(-4.79)	(1.46)	(-2.44)	(-0.35)	(2.32)
GDP Size	-0.02	0.16**	0.05	0.56***	0.01	0.05	0.09**	0.30**
	(-1.36)	(2.20)	(0.80)	(4.75)	(0.58)	(0.54)	(1.99)	(2.36)
VIX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
R-squared	0.98	0.99	0.96	0.97	0.87	0.96	0.81	0.85
Nb of Observations	415	90	415	90	415	90	415	90
Nb of Bonds	60	20	60	20	60	20	60	20
Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y

t statistics in parentheses
Note: Common sample and Maturities 1Y to 5Y. Standard-errors are adjusted for heteroskedasticity, contemporaneous cross-panel correlation and first-order autocorrelation.
* p<.10, ** p<.05, *** p<.01

Appendix

Appendix Table 1: Data Availability Data - Average Starting Date of Historical Series

Country	FX Issue by Issue Number of Bonds	FX Issue by Issue Starting Date	LC Thomson Reuters	LC Bloomberg Par Curve	LC Bloomberg ZC Curve
Argentina	142	2007	2007	#N/A	#N/A
Austria	96	1997	2003	1994	1998
Belgium	38	1997	2005	1994	1998
Brazil	64	2003	2007	2007	1998
Canada	29	1999	1994	1992	1994
Chile	9	2006	2008	2005	2005
Colombia	47	2001	2004	2003	2005
Croatia	21	2004	2008	2003	2007
Czech Republic	9	2010	2002	1997	1997
Denmark	72	1998	1996	1994	1994
Finland	56	1995	2000	1998	1998
Greece	29	2002	2001	2001	2000
Hungary	30	2007	2000	1999	1998
Indonesia	19	2007	2004	2003	1998
Ireland	36	1994	2002	1995	1998
Israel	15	2004	2003	2005	1998
Italy	53	2002	1995	1997	1998
Malaysia	13	1998	2005	1999	1999
Mexico	79	2002	2005	2003	2002
Philippines	38	2004	2003	1998	1996
Poland	73	2007	2005	2000	1998
Portugal	11	1997	2002	1994	1998
Russia	25	2001	2003	2006	2007
Slovakia	4	2008	2006	2003	2005
South Africa	22	2002	2003	1994	1994
Spain	31	1998	1996	1994	1998
Sweden	124	1997	1997	2005	1994
Thailand	19	2001	2000	1999	1994
Turkey	102	2000	2006	2007	2005
Venezuela	44	2004	2006	#N/A	#N/A
Total / Average	*1350*	*2002*	*2003*	*2000*	*1999*

Note: 1. FX Issue by Issue relate to average issuance date or first date when the bond price is observed, while Thompson Reuters and Bloomberg present average starting date across available maturities
2. FX bonds have been sorted according to availability from best to worst

Appendix Table 2.

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F(1, 321) = 324.824
Prob > F = 0.0000

ARTICLE 4

The Growth of Local Currency Emerging Market Debt

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Abstract

Broad and rapid development of local currency bond markets in emerging economies over the last two centuries startled policymakers and international investors. Using a new dataset on foreign holdings of government debt, we show that foreign demand is a key driver of the growth of local currency debt in emerging markets and that the main culprit of that increased demand is the low interest rate environment brought about by the Federal Reserve's unconventional monetary policy. The second motive of foreign currency participation is speculative, as FX interventions of central banks in emerging economies tend to attract foreign investors. Finally, although growth and inflation forecasts remain important indicators for both the development of local currency debt market and foreign participation therein, we find that institutional and political risk factors play a very limited role in both processes.

Keywords: local currency, sovereign debt, foreign investors.

JEL Codes: F31, F34, G15

[21]We thank … Albuquerque is from Boston University, Católica-Lisbon School of Business and Economics, CEPR, and ECGI; Brandao-Marques is from the International Monetary Fund; Jeanneret is from HEC Montreal; and Orpiszewski is from Candriam Investors Group. The views expressed herein are those of the authors and should not be attributed to the International Monetary Fund, its Executive Board, or its management.

1. Introduction

After half a century of currency crisis and sovereign defaults, over the last two decades numerous emerging economies successfully developed local currency bond markets where governments could raise funds without exposing themselves to currency risk. As macroeconomic stabilization and capital account liberalization progressed, international investors regained confidence and interest in emerging market (EM) debt.

As a result, between 1996 and 2013 foreign investor participation in local currency debt markets increased from 5% to 21% on average. However, the extent and historical evolution of foreign participation in local currency bond markets differs from country to country. At the same time, the average maturity of EM debt issuance has been increasing, further contributing to an overall improvement of these countries' debt profile. Interestingly, Figure **27** illustrates that the increase in the average life of these bonds has closely mimicked the average maturity of central bank holdings of sovereign debt in developed markets (DM), namely by the Federal Reserve. In principle, the concurrent increase in maturities of securities acquired by central banks in the context of quantitative easing and of bond securities issued by EM sovereign and corporate, suggests a causal link. This trend in EM debt is most likely related with the gap filling theory of corporate debt developed by Greenwood, Hanson, and Stein (2010), whereby firms and EM sovereigns act as large-scale liquidity providers in response to shocks to the maturity structure of DM government debt.

The objective of this study is to determine empirically the contribution of foreign and local demand to the recent growth of local currency sovereign debt. Results show that foreign demand is a key driver behind the growth of local currency debt in emerging markets, and that the main culprit of that increased demand is the low interest rate environment brought about by the Federal Reserve's unconventional monetary policy. The second motive of foreign currency participation is speculative, as FX interventions of central banks in emerging economies tend to attract foreign investors willing to benefit from currency appreciation. While growth and inflation forecasts remain important indicators for both the development of local currency debt market and foreign participation therein, we find that institutional factors like political risk, bondholder protection or central bank independence play a very limited role in both processes. In light of monetary policy

normalization in advanced economies our results remain highly relevant for investors, issuing governments and policymakers.

2. Related Literature

Existing empirical literature on local currency debt markets in emerging economies covers three distinct fields. The first one focuses on original sin, currency denomination of debt and the resulting macroeconomic and financial vulnerabilities, the second one highlights the link between sovereign risk and fundamentals, while the third one links foreign participation in local currency bonds to bond yields and returns.

2.1 Original sin, currency denomination and sovereign defaults

Debt composition is adjacent to three important macroeconomic phenomenons, i.e. original sin, debt intolerance and currency mismatches. In the seminal paper Eichengreen and Hausmann (1999) coined the hypothesis of the original sin where countries with weak institutions and poor macroeconomic track record have no choice but to issue short-term debt in foreign currencies. This is due to the lack of confidence of international investors who are not willing to purchase long-maturity debt in local currency, as high and volatile inflation, unreliable institutions and political instability tend to increase the probability of default risk and exchange rate depreciation. Reinhart, Rogoff, and Savastano (2003) introduced the concept of debt intolerance which manifests itself in the extreme duress many emerging markets experience already at low levels of external debt that would seem manageable by advanced country standards. Currency mismatches, understood as a combination of foreign indebtedness and external vulnerabilities, have been at origin of numerous currency, sovereign and banking crisis in the past, as explained by Kaminsky and Reinhart (1999), Guillermo A. Calvo (1996) and others.

Eichengreen, Hausmann, and Panizza (2003) argue that original sin, debt intolerance and currency mismatches are three inter-related but distinguishable phenomenons. In their view debt intolerance encompasses institutional weaknesses of emerging economies that lead to weak, inconsistent and unreliable policies, while the original sin school traces the problem of the allocation of global portfolios and demand for assets by international financial markets. Finally,

currency mismatches are closely related to the two effects, but the country may or may not incur a currency mismatch, depending on how the financial and monetary authorities respond to that act of borrowing. In other words, foreign borrowing as such can be seen as a policy choice rather than an inherent institutional or fundamental weakness. Burger and Warnock (2006b) investigate these relationships looking at bond markets in 49 emerging economies and present evidence that original sin is not an inherent element in the EM universe. Their findings indicate that countries with better institutional quality and policy performance tend to have more developed local currency bond markets, reduced currency mismatches, and lower likelihood of default.

Several authors attempted to analyze the currency structure of government borrowing and its determinants. Mehl and Reynaud (2010) construct a new dataset for 33 emerging economies and show that while the share of inflation-indexed and short-term debt diminished significantly between 1994 to 2006, the proportion of foreign debt remained low but stable over time. Moreover, econometric results imply that the share of foreign, inflation-linked or short-term debt tends to be higher in countries with high inflation, narrower investor base and loose fiscal policy. Guscina and Jeanne (2006) introduce a similar dataset on currency and maturity composition for 19 emerging economies and present empirical findings indicating that issuance of medium to long maturity debt is related to both inflation level and volatility.

Last but not least, Hausmann and Panizza (2011) review the validity of the original sin hypothesis in emerging markets and find that even though the number of countries issuing mainly local currency debt has increased, the improvement is rather marginal. Authors conclude that governments prefer to "abstinate" from borrowing entirely rather than to borrow in foreign currency debt due to its riskiness.

2.2 Determinants of Foreign Currency Sovereign Risk

With the introduction of Brady bonds in 1989 most emerging economies switched from direct borrowing from international banks to issuance of tradable bonds in foreign currencies. From this moment onwards the riskiness has been continuously priced by bondholders based on key political, fiscal and macroeconomic criteria.

As far as political and institutional setting is concerned, Duffie, Pedersen, Singleton (2003) demonstrate that official foreign reserves as well as the country's political risk determine a large share of sovereign bond spreads. Bekaert et al. (2014) find evidence that sovereign credit risk increases with political risk, while (Cosset and Jeanneret 2014) show that better governed countries have lower default risk and bear a smaller sovereign credit risk premium.

In terms of macroeconomic determinants, Hilscher and Nosbusch (2010) find that the volatility of the terms of trade tends to increase sovereign spreads, while Maltritz, Bohn and Eichler (2012) document that lower economic growth and greater trade openness increase sovereign default risk. Aizenman, Jinjarak, and Park (2013) find that while inflation, state fragility, external debt and volatility of terms of trade reduce the sovereign risk, trade openness and fiscal balance/GDP ratio are negatively associated with sovereign CDS spreads.

2.3 Link between Foreign Participation, Bond Yields and Returns

Empirical literature on foreign participation in emerging market bonds covers determinants of yields on one hand and the portfolio allocation of international investors on the other hand.

Analyzing the impact of foreign participation on bond yields in 10 emerging markets, Peiris (2010) shows that while foreign participation tends to reduce yield levels, it does not necessarily induce higher liquidity in the market and in certain cases could even dampen volatility. In turn, Ebeke and Yinqiu (2014) analyze the relationship between yields and foreign participation in 12 emerging economies using data from national sources. Empirical findings indicate that countries which have been able to attract a higher share of foreign investors in their local currency government bonds enjoy lower yields, but are more susceptible to market sentiment. They emphasize the fact that the benefit of lower yields arising from foreign investors is universal across EMs regardless of their macroeconomic fundaments. Last but not least, Jaramillo and Zhang (2013) investigate empirically the relationship between bond yields and holdings of government debt and show that while bond yields tend to rise with the debt to GDP ratio, this increase is partly offset if debt is held by domestic non-bank investors as well as foreign central banks.

Burger and Warnock (2006a) and Burger, Warnock, and Warnock (2010) analyze the portfolio allocation of US-based investors to emerging market local currency bonds and find that investors tend to increase participation in countries with more stable institutions and identifiable investor-friendly institutions and policies. Burger et al. (2014) find that the allocation of US investors to EM bond is due not only to 'push factors' such as low US interest rate, but also to 'pull factors', as the EMs with greater current account balances, less volatile inflation, and stronger economic growth tend to attract more foreign capital.

Eichengreen and Luengnaruemitchai (2008) investigate the drivers of cross-country capital flow in bond markets using CPIS data between 2001 and 2003. Their results show that cross-holdings are heavily driven by financial conditions in the lender country, which means that bond market conditions could adjust abruptly for reasons having nothing to do with policies in the borrowing economy. On top of that evidence implies that international bondholders are attracted to the securities of countries whose returns co-vary with their own which can be interpreted as return-chasing rather than diversification-based behavior.

3. Hypothesis Development

This section develops several explanations for the recent emergence and growth in emerging markets of the market for local currency sovereign debt. We view the demand for local currency sovereign debt as the main culprit for these market developments. The main reason is that issuing debt in local currency involves lower fixed costs and exhibits lower credit risk, all else equal, than issuing debt in foreign currency. Yet, for long time governments have issued debt exclusively in foreign rather than in local currency. By revealed preference, this observation means that things were not all else equal in both markets and that demand for local currency debt must have been very limited. The situation has gradually changed over the last two decades and our goal is to explain this phenomenon. We identify in this section various domestic and foreign demand channels that can potentially explain the time and the cross-country variation in the development of the local currency sovereign debt market in emerging economies. We develop a set of hypotheses that we subsequently test using the new dataset.

3.1 Local investment risk

Investors care about the riskiness of their investment holdings and the risk embedded in local-currency government debt is twofold. First, investors fear that a rise in inflation will erode the value of their debt holdings, as it would do for any financial asset paying fixed nominal coupons in local currency. Second, the risk of default strongly matters to investors, as they recover only a fraction of the debt face value during debt restructurings, as explained by Cruces and Trebesch (2013) among others. This risk is particularly acute in emerging markets, but also in certain advanced economies, as the European debt crisis has attracted much attention over recent years. An important empirical driver of the default probability on local currency debt is the inflation level, as described by Jeanneret and Souissi (2014). Governments are more likely to recourse to debt monetization when inflation is severe, as a further rise in inflation would be too costly for the economy. Hence, inflation constitutes the main risk to investors, since it affects both the real value of local-currency government bond and its default risk. As a result, we conjecture that lower investment risk, i.e. lower inflation, raises not only the demand of local-currency government bonds but also its supply. Lower risk premium provides governments the incentive to issue more debt in their local currency, as they can tap into cheaper financing. Our first hypothesis is thus as follows:

Hypothesis 1: *A lower level of investment risk should foster the market for local-currency government debt. However, it should not affect the composition of the debtholders.*

We consider testing this hypothesis with two measures of expected inflation. First, we analyze the inflation forecasts taken from the IMF IFS database. Second, we build on the idea that central bank independence can be viewed as a means of mitigating future inflation, as arguey by Kydland and Prescott (1977), Barro and Gordon (1983) and Rogoff (1985). Our instrument is the index of central bank independence constructed by Dincer and Eichengreen (2014).

3.2 Local demand shocks

Our second hypothesis is that incentives for increased savings in local currency by domestic agents raise the demand for risk-free long-term assets such as local currency sovereign bonds. This secular development is important in emerging markets and goes beyond a shift in private savings. The central pattern is related to the deregulation and financial innovation in the

insurance market, including new annuity insurance, life insurance and health insurance products. Long-term liabilities in the insurance sector require substantial amounts of assets with similar maturities, leading to an increased demand for long-term assets in local currency. In consequence, the domestic institutional investor base accelerates the growth of the local currency government bond market.

This persistent demand for local-currency sovereign bonds from the insurance sector provides an extra incentive for international investors to invest in opportunistic manner. Global investors anticipate that as the demand from local agents and insurance companies grows, it will become relatively easier to find an adequate counterparty at the time of selling the bonds which makes it easier to exit the market. In a sense, the insurance sector provides a sort of implicit insurance of future demand and liquidity for external investors. Our testable hypothesis is that:

Hypothesis 2: *The development of a domestic institutional investor base increases the demand for local currency government bonds and provides incentives for international investors to enter the market.*

On the empirical side, we propose to exploit variation in the size of pension funds and insurance sector to instrument the future demand in local-currency government debt. Our measure consists of the sum of the assets of insurance companies and pension funds, as a percentage of the country's GDP.

3.3 Foreign demand for risky assets

The next set of hypothesis relates to the changing appetite of foreign investors for emerging market local currency debt. We explore different channels that offer incentives for higher/lower currency risk exposure: i) the global interest-rate environment and the diversification offered to international investors; ii) the level of exchange rate uncertainty; and iii) the development of the derivative market for currency hedging.

3.3.1 Global interest-rate environment and diversification

Monetary authorities such as the Federal Reserve, the European Central Bank, the Bank of England or the Bank of Japan typically adjust their policies to the economic and financial environment. These institutions have pursued low short-term interest rate policies which have

been coupled with innovative policy tools named broadly Quantitative Easing (QE). Under this type of program central banks not only buy pre-determined amounts of sovereign bonds from their respective domestic governments, but also purchase fixed income securities backed by mortgages or similar risky assets. These unconventional policies have reduced long-term interest rates in the government bond market to extremely low levels.

As a consequence, many of the financial institutions, pension funds, and private investors that rely on long-term fixed income securities tend to search for higher yields abroad. The low interest-rate environment has thus led to renewed interest in international investments and has been an engine for the growth of the local-currency sovereign bond market. The third hypothesis thus states that

Hypothesis 3a: *Accommodative monetary policies in developed countries provide global investors incentives to invest in the local-currency debt market in emerging economies.*

We instrument the role of monetary policies using the U.S. shadow policy rate developed by Krippner (2014). This rate captures the global interest rate environment, while accounting at the same time for the unconventional monetary policies.

Diversification motives can also lead foreign investors to enter the local-currency sovereign debt market. Du and Schreger (2014) show that local-currency debt is less correlated to US factors than foreign-currency debt, thus providing diversification to global investors. The related hypothesis that we consider is as follows:

Hypothesis 3b: *Greater asset diversification provides global investors incentives to invest in the local-currency debt market in emerging economies.*

To test whether higher diversification fosters growth in the local-currency debt market through a greater demand from foreign investors, we compute the correlation between XXX and the US equity market.

3.3.2 Exchange rate risk

Local currency bonds in emerging markets attract foreign investors because such securities typically offer higher yields than the government bonds issued in developed countries. In addition to this yield differential, investors speculate that emerging currencies will not

depreciate relative to the low interest rate currencies (e.g., USD and JPY), as the uncovered interest rate parity would imply. An investment in high yield currencies funded by low interest rate currencies, with the expectation that the currency depreciation will not offset the interest rate differential, is essentially a carry trade investment strategy. This strategy, which has been thoroughly analyzed in recent studies, offers negative returns when the currency market becomes more volatile (see, e.g., Brunnermeier, Nagel, and Pedersen, 2009; Menkhoff et al., 2012; Bakshi and Panayotov, 2013). We thus expect that investors have greater confidence in investing in high-yield currencies when the uncertainty related to exchange rate movements is low. We thus propose the following hypothesis:

Hypothesis 4a: *International investors are more likely to invest in local-currency government bonds if the exchange rate displays less uncertainty.*

We test whether exchange rate uncertainty affects international investors using the central bank's commitment to exchange rate stability as an instrument for future currency volatility reduction. We measure this commitment with an index of public announcements by central officials and media comments on foreign exchange interventions by the local monetary authorities aimed at curbing currency volatility. We have manually collected these news events through the Bloomberg analytics engine.

Among all investors buying emerging market bonds, not all of them wish to maintain local currency exposure. Unfortunately, hedging exchange rate risk in emerging markets has been difficult and costly for a long time, as the market for Over the Counter (OTC) foreign exchange derivatives remained rather illiquid for such currencies. Hence, the exchange rate has been an important source of unhedgeable risk for foreign investors, encouraging the emergence of the popular Brady bonds in the 80s and 90s. Nevertheless, we have experienced a gradual increase in standardized derivative contracts on emerging currencies over the recent years. We suggest that the development of such products allows foreign investors to better hedge their currency exposure and thus encourages them to buy local-currency debt in emerging markets.

Hypothesis 4b: *The introduction of derivative contracts for currency hedging should increase the participation of foreign investors in the local-currency government bond market.*

We test this hypothesis with the introduction of standard futures contracts in the Chicago Mercantile Exchange (CME). The introduction date, which varies by currency, is our instrument of foreign investors' ability to hedge currency risk in emerging markets.

4. Data and empirical strategy

4.1 Government debt holdings

We construct a new dataset, which has been meticulously compiled using data from national sources such as central banks, ministries of finance, statistical authorities and securities depositories. It includes historical series of government debt holdings issued in local currencies in 19 emerging countries located in EMEA, Asia and Latin America which differ in terms of size, level of development and level of debt. Our dataset decomposes government debt into two dimensions: local vs foreign currency debt denomination and local vs. foreign debt holders of local currency debt. This paper is unique in this regard, and thus departs from other existing studies, as explained in the comparison with other datasets in Appendix Part 2. The main variables of interest are the size of the local currency government debt market, measured as a percentage of the country's GDP, and foreign participation, which is computed as the fraction of local currency government debt held by foreign investors.

This study considers quarterly data for the period 1996 to 2013, which covers several crises in emerging and developed markets and the gradual development of local currency debt markets in emerging economies. Data availability differs across countries, as can be seen in Table 1. Table 2 presents the size of the local-currency debt market at the country level, which equals 28.2% on average while the foreign investor share equals 12.3% on average.

Table 1 suggests that the foreign investor share in the local currency bond market substantially increased between 1996 and 2013. The average foreign share rises from 5.7% to 21.3% over this period, though the extent and historical evolution of foreign participation in this market greatly differs across countries. Most countries exhibit a rapid increase in the importance of foreign investors in this market, which typically represent about a third of the investor base. In contrast, Table 2 illustrates that some countries such as Bulgaria, Chile, Colombia, India, and Israel, have consistently displayed a low foreign participation in this market. The data also

implies strong heterogeneity regarding the time of inception of the local currency debt market. In the next step we exploit the cross-country and the time-varying information provided by the data.

4.2 Econometric Approach

Following the discussion in the previous section, we choose the following specification to test the main hypothesis.

Eq. 1 $$LC_{it} = \alpha_i + DD_{it}'\Gamma_1 + \gamma_2 FS_{it} + \mathbf{x}_{it}'\mathbf{b} + \varepsilon_{it},$$

where *LC* is the total local currency-denominated sovereign debt of country *i* in quarter *t*, as a percentage of that country's GDP, *DD* is a vector with variables representing domestic investor demand variables, *FS* is the foreign participation in country *i*'s local currency sovereign bond market, . The vector x contains a set of country controls which include the interest differential between country *i*'s short-term interest rate the Eurodollar rate for the U.S. dollar, the 12-month ahead GDP growth and inflation forecasts, the lagged fiscal balance, and the lagged Political Risk Rating measured by ICRG. In an alternative specification, we have added a linear time trend in order to capture an overall financial globalization trend.

The fundamental problem in our econometric investigation is one of joint determination of the total local currency–denominated sovereign debt and the share of the same debt that is owned by foreign investors. For this reason, we estimate Equation 1 using two-stage least squares (2SLS) with country fixed effects. In line with the hypothesis development discussion, and subject to data availability, we use several instruments, detailed in Table 5.

5. Results

In terms of general demand indicators and control variables, results in Table 3 demonstrate that higher GDP growth expectations and higher inflation expectations are associated with lower levels of local currency debt. The former probably reflects the fact that debt as share of GDP tends to fall when countries are growing fast, while the latter supports the notion that low inflation limits the risk of debt monetization and deepens domestic debt markets by making local currency bonds more appealing to foreign investors, as observed by Burger and Warnock (2006b) and Eichengreen, Hausmann, and Panizza (2003). Surprisingly, the interest rate

differential relative to the U.S. rates is not significant in any of the settings which might be due to the use of short term interest rates.

However, when controlling for the endogenous nature of foreign demand of local currency debt, the domestic demand variables are no longer significant while, for the most part, foreign demand retains explanatory power. In fact, using the 2SLS results in columns (2) through (9), we can see that the strongest candidates in terms of explanatory hypothesis are monetary policy and the low interest-rate environment (column 2), development of the FX market (column 6) and bond market liquidity. Overall, the coefficients in the first regressions of all instruments have the expected signs despite the varying degree of significance and the only variable which is not significant at all is the correlation of the local equity market index with the S&P 500.

The benchmark 2SLS results for the full set of instruments are summarized in columns (8) and (9). From a statistical point of view, the results are valid since Hansen's J-statistic is low and we cannot reject the instruments being valid. In column (10) we report a 2SLS regression using only the regressors which showed to have explanatory power in (8) and (9), i.e. the shadow policy rate and the index of FX interventions. For this narrower set of instruments, the F statistic of the first stage regression is 13.70, well above the conventional threshold value of 10. This signals that our results are not affected by the weak instruments problem, as explained by Angrist and Pischke (2009). Since the results are very similar to (8) and (9), we conclude that they are not being driven by weak instruments.

Most importantly, the results in these columns (8) through (10) suggest that foreign demand is a key driver of the growth of local currency debt in emerging markets, and that the main culprit of that increased demand is the low interest rate environment brought about by the Federal Reserve's unconventional monetary policy. The second most important instrument are the foreign exchange interventions of central banks in emerging economies that are deemed to increase currency valuation.

Our results are in line with previous work by Moore, Nam, Suh, and Tepper (2013) on the foreign ownership of local currency sovereign debt for a smaller set of countries. In their paper, they show that the large-scale asset purchases (LSAPs) by the Federal Reserve reduce long-term U.S. Treasury yields, which raises the foreign ownership share of emerging market debt.

However, their article does not explain the issuance of local currency bonds, which is the main focus of our work.

6. Conclusion

After many years of currency crisis and sovereign defaults, over the last two decades numerous emerging economies successfully developed local currency bond markets where governments could raise funds without exposing themselves to currency risk. As macroeconomic stabilization and opening up to capital flows advanced, international investors started to regain confidence. In consequence, between 1996 and 2013 foreign investor participation in local currency debt markets increased from 5% to 21% on average, yet the extent and historical evolution of foreign participation in local currency bond markets differs from country to country.

The objective of this study is to determine empirically what shapes domestic bond markets on one side and what attracts foreign investors on the other. Empirical results show that foreign demand is a key driver of the growth of local currency debt in emerging markets, and that the main culprit of that increased demand is the low interest rate environment brought about by the Federal Reserve's unconventional monetary policy. The second motive of foreign currency participation is speculative, as FX interventions of central banks in emerging economies tend to attract foreign investors. While growth and inflation forecasts remain important indicators for both the development of local currency debt market and foreign participation therein, we find that institutional factors like political risk, bondholder protection or central bank independence play a very limited role in both processes.

After nearly a decade of zero interest rate policy in the US and other advanced economies, the incertitude about investors' behavior remains a night-breaking dilemma for issuing governments, policymakers and investors. Our results call for close monitoring of foreign investors' behavior during the period of interest rate normalization in advanced economies.

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Table 1 – Foreign Ownership of Local Currency Debt by Country and Year

Country	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Brazil												3.7	6.7	7.5	10.9	11.3	12.9	14.8	
Bulgaria										1.0	0.7	0.6	1.3	0.7	0.9	1.0	1.0		
Chile										0.0	0.0	0.0	0.0	0.0	1.8	3.5	3.5	3.1	
Colombia															1.4	3.0	3.3	5.3	
Czech Republic	3.9	5.3	7.1	5.8	3.1	4.0	4.8	5.2	10.5	8.6	8.1	10.9	14.3	8.0	8.9	14.2	12.9	13.7	14.5
Hungary		2.8	8.3	9.1	15.0	19.7	23.3	27.8	27.8	28.4	27.7	29.2	26.8	20.4	21.4	32.4	37.8	38.0	
India												0.3	0.5	0.4	0.6	0.9	1.0	1.5	
Indonesia						0.0	0.1	1.1	2.0	5.5	12.6	16.9	17.6	15.6	26.3	31.9	29.8	33.2	
Israel											2.3	3.9	2.0	2.4	7.1	10.4	5.4		
Latvia	15.0	5.0	0.2	0.2	2.2	10.5	1.2	3.0	2.5	5.3	6.0	24.3	16.0	2.2					
Malaysia	2.9	2.5	1.6	0.7	0.2	0.2	0.2	0.1	1.9	6.3	6.9	12.1	18.1	13.9	24.6	33.0	40.6	46.2	
Mexico				2.9	1.4	1.7	1.7	2.5	5.8	9.0	8.9	9.1	13.0	10.7	15.8	24.4	31.6	37.7	
Peru									0.0	18.9	25.7	27.9	33.5	21.1	27.9	44.2			
Poland				8.8	16.2	15.7	16.1	16.5	19.8	23.0	21.4	20.4	16.1	15.7	22.8	28.9	33.3	35.9	
Romania															6.5	12.0	8.0	21.6	19.0
Russia										0.0	0.0	0.0	0.0	0.0	0.0	0.9	11.2	24.6	22.4
South Africa											7.8	10.4	12.9	13.4	20.7	28.0	32.5	37.2	
South Korea							0.4	0.5	0.8	0.7	1.4	5.7	10.1	8.0	11.8	14.4	13.8	13.0	
Thailand								1.5	2.4	2.7	2.2	0.7	4.9	5.1	9.1	13.9	15.6	17.0	
Turkey											10.8	14.6	12.0	8.8	11.2	16.1	20.0	24.9	
Total	5.7	4.2	4.3	4.0	6.4	8.3	6.6	6.5	7.3	9.1	8.9	10.6	11.4	8.5	12.2	17.1	18.2	21.3	17.4

Table 2 - Dependent Variables by Country

Country	Number of Observations	*LC Debt*		*Foreigh Share of LC Debt*	
		Average	Standard Deviation	Average	Standard Deviation
Brazil	15	62.56	1.418	11.44	1.775
Bulgaria	29	5.264	0.762	0.889	0.296
Chile	31	4.169	3.306	1.442	1.742
Colombia	16	25.54	0.699	3.256	1.532
Czech Republic	57	25.57	5.725	9.189	4.321
Hungary	53	49.42	2.726	26.21	6.271
India	27	33.23	2.068	0.737	0.391
Indonesia	14	13.52	0.506	29.87	3.619
Israel	28	57.42	1.782	4.794	3.090
Latvia	16	5.952	1.512	12.16	9.965
Malaysia	53	39.59	6.935	12.80	13.88
Mexico	56	15.64	6.700	12.36	11.17
Peru	32	8.474	2.618	24.90	13.21
Poland	45	33.15	4.167	21.99	6.350
Romania	14	17.01	2.991	13.72	6.824
Russia	35	20.64	6.644	4.189	8.477
South Africa	32	28.40	5.434	20.33	10.63
South Korea	37	44.32	2.512	8.212	5.345
Thailand	40	26.60	2.770	6.201	5.414
Turkey	30	27.94	1.921	14.12	4.758
Total	660	28.25	15.85	12.27	11.26

Table 3 - Determinants of Local Currency Sovereign Debt

This table presents estimates of firm fixed effects panel regressions of total local currency sovereign debt as a percentage of GDP (*LC*) on the share of such debt owned by foreign investors, two variables representing domestic investor demand (*Domestic Institutional Investor Assets* and an index of property rights), and a set of controls. The table shows OLS (column 1) and 2SLS (columns 2 through 4) estimation results using specification (1). For 2SLS estimations, the bottom panel shows the first-stage regression results. Variable definitions are provided in Table X. Robust *p*-values adjusted for country-level clustering are reported in brackets. *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively

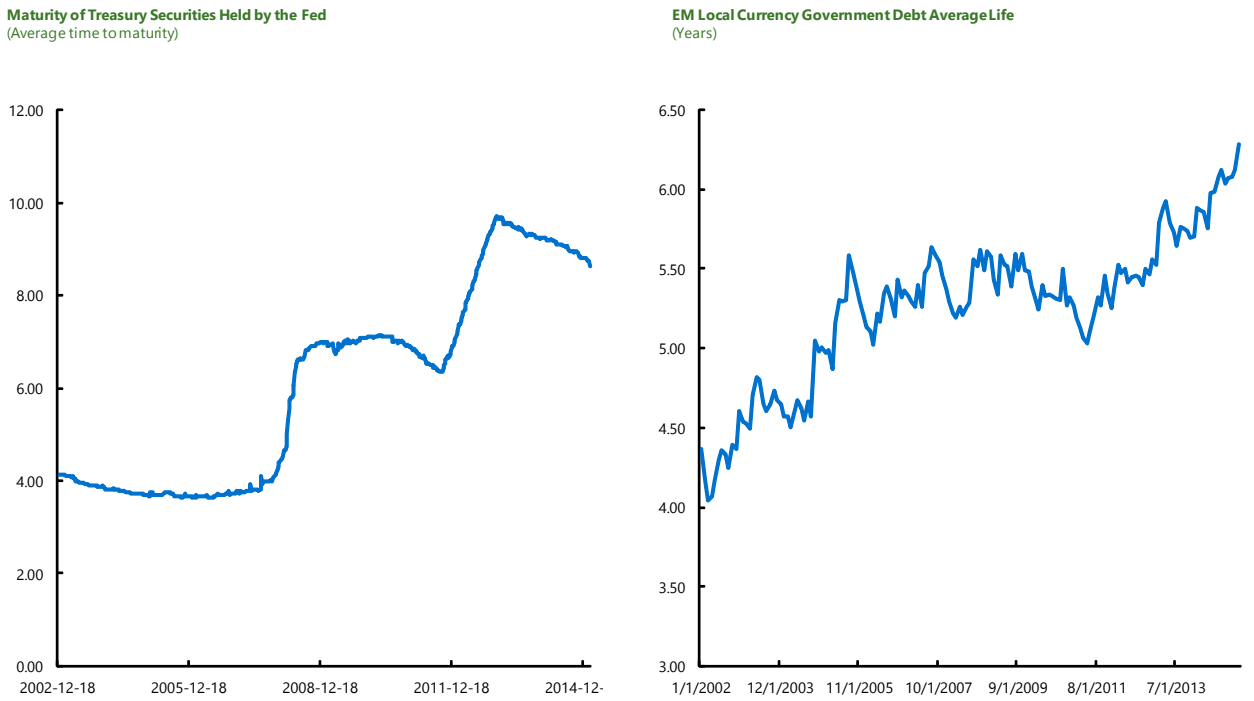
Second-stage regressions	LC Debt to GDP									
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Foreign Share	0.294***	0.497***	0.360*	0.796**	-0.095	0.316	0.369***	0.478***	0.447***	0.490***
	(0.000)	(0.000)	(0.059)	(0.025)	(0.877)	(0.536)	(0.005)	(0.000)	(0.000)	(0.000)
Domestic Institutional Investor Assets	0.091***	0.030	0.071	-0.058	0.206	0.084	0.059*	0.036	0.037	0.033
	(0.001)	(0.334)	(0.213)	(0.605)	(0.215)	(0.560)	(0.071)	(0.196)	(0.157)	(0.266)
Property Rights	-0.218	0.266	-0.060	0.981	-1.148	-0.166	-0.150	0.221	0.031	0.249
	(0.750)	(0.739)	(0.947)	(0.565)	(0.498)	(0.864)	(0.843)	(0.778)	(0.972)	(0.756)
Interest Rate Differential	0.016	-0.049	-0.005	-0.144	0.140	0.009	0.042	-0.043	0.005	-0.046
	(0.901)	(0.658)	(0.974)	(0.277)	(0.630)	(0.966)	(0.668)	(0.707)	(0.960)	(0.680)
GDP Growth Forecast	-0.275*	-0.468***	-0.338	-0.753**	0.095	-0.296	-0.443**	-0.450***	-0.510***	-0.461***
	(0.052)	(0.003)	(0.212)	(0.031)	(0.882)	(0.556)	(0.013)	(0.004)	(0.004)	(0.004)
Inflation Forecast	-0.737**	-0.645**	-0.707**	-0.508	-0.915**	-0.727***	-0.801***	-0.654**	-0.712*	-0.648**
	(0.016)	(0.016)	(0.031)	(0.213)	(0.048)	(0.005)	(0.009)	(0.014)	(0.058)	(0.017)
Political Risk	-0.156	-0.011	-0.109	0.203	-0.435	-0.141	-0.108	-0.025	-0.052	-0.017
	(0.189)	(0.923)	(0.560)	(0.450)	(0.376)	(0.729)	(0.405)	(0.829)	(0.647)	(0.886)
Observations	660	660	660	660	660	660	568	660	568	660
Number of Countries	20	20	20	20	20	20	17	20	17	20
R^2	0.565	0.466	0.555	-0.046	0.197	0.564	0.574	0.484	0.527	0.529
First-stage R^2 (excluded instruments)		0.2382	0.0111	0.0197	0.0128	0.0094	0.0995	0.2571	0.2907	0.2553
Hansen's J-Statistic								3.146	2.233	1.130
P-Value								0.534	0.816	0.568

Robust p values in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

First-stage Regressions	Foreign Share of LC Debt								
Variables	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Insurance and Pension Fund Assets	0.168***	0.299***	0.277***	0.260***	0.274***	0.120	0.159***	0.109*	0.169***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.224)	(0.004)	(0.064)	(0.001)
Property Rights	0.340	-2.244	-1.893	-1.543	-2.162	-0.299	0.846	1.577	0.560
	(0.868)	(0.362)	(0.432)	(0.589)	(0.397)	(0.893)	(0.694)	(0.437)	(0.767)
Interest Rate Differential	-0.272	0.275	0.288	0.394	0.444	0.427	-0.319	-0.280	-0.334
	(0.421)	(0.227)	(0.230)	(0.142)	(0.138)	(0.204)	(0.329)	(0.470)	(0.301)
GDP Growth Forecast	1.126***	0.993***	1.052***	1.039***	1.048***	1.024**	1.194***	1.302***	1.178***
	(0.000)	(0.005)	(0.002)	(0.003)	(0.002)	(0.015)	(0.000)	(0.005)	(0.000)
Inflation Forecast	0.118	-0.417	-0.388	-0.397	-0.496	-1.050	0.202	-0.130	0.175
	(0.796)	(0.449)	(0.510)	(0.476)	(0.379)	(0.149)	(0.613)	(0.801)	(0.682)
Political Risk	-0.270	-0.731**	-0.668**	-0.696**	-0.670**	-0.515	-0.287	-0.217	-0.283
	(0.219)	(0.015)	(0.019)	(0.017)	(0.022)	(0.125)	(0.148)	(0.337)	(0.155)
U.S. Shadow Policy Rate	-1.396***						-1.406***	-1.399***	-1.415***
	(0.000)						(0.000)	(0.000)	(0.000)
FX Interventions		0.062					0.077*	0.091*	0.077*
		(0.188)					(0.066)	(0.053)	(0.069)
Correlation with S&P500			6.741				-0.183	1.328	
			(0.123)				(0.952)	(0.695)	
Central Bank Independence				0.864			0.362	0.207	
				(0.138)			(0.565)	(0.759)	
CME FX Futures					2.735*		-0.466	-1.551	
					(0.092)		(0.827)	(0.518)	
Equity Trade Costs						-0.224**		-0.089	
						(0.045)		(0.296)	
Observations	660	660	660	660	660	568	660	568	660
R^2	0.427	0.257	0.263	0.258	0.255	0.331	0.441	0.473	0.440
Number of Countries	20	20	20	20	20	17	20	17	20

Robust p values in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Figure 27. U.S. Monetary Policy and EM Debt Maturity



Sources: DataStream; FRED database; authors' calculations.
Note: EM local currency government debt average life is value-weighted average life of JPM-GBI indices for Brazil, Hungary, Malaysia, Mexico, Poland, Russia, South Africa, and Turkey.

Appendix

Investor Classification

The objective of the classification is to distinguish between non-residents in general and various types of domestic holders following broadly the guidelines set by the European Commission22 and the IMF. The rationale behind the classification goes back to inherent differences in investment objectives, investment horizon and risk aversion. In reality only a handful out of 16 countries considered in this study apply similar categorization. Number of investor categories and subcategories varies strongly between

[22] Further information on European system of national and regional accounts (ESA95) is available on the Eurostat webpage. IMF Dissemination Standards Bulletin Board (DSBB) is available on the IMF website.

countries ranging from four in Bulgaria to 26 in Czech Republic. To circumvent this lack of consistency[23] between datasets it is essential to regroup original categories into standardized one according to investor characteristics. As presented in Table 2, we developed a bondholder classification that would ensure most consistent number of categories across countries and focus on key categories: non-residents, banks, general government, insurance and pension funds, mutual funds, households and non-financial companies. While the attribution is straightforward for banks, non-residents and domestic central banks, classifying other domestic actors requires certain assumptions on investor profiles in terms of risk, return and investment horizons. Accordingly, we assume that pension and insurance funds have long-term oriented and less liquidity-driven and can be merged into one group. In contrast, investment and mutual funds, more return-oriented and liquidity-prone, are compatible with objectives of financial auxiliaries like securities brokers.

Data on bankholings is available for all countries, 14 countries publish series for insurance and pension funds, 12 for investment and mutual funds, 10 for domestic central banks and 8 for social security holdings. Last but not least, Statistics available for Indonesia and Mexico include a large share of unattributed holdings. To rectify this incoherence, WE assume that each investor group holds an equal amount of residual government bonds and attribute those holdings accordingly.

[23] Several datasets include negative figures, we.e. Japan Bonds 1998-1999 for Investment Funds, UK Bonds several observations between 2002 and 2008 for Banks, Denmark bills in 2005, 2011, 2012 for Pension and Insurance Funds, Germany Bills 2006, 2008 and 2009 for Banks. Negative values have been removed from the analysis.

Appendix Table 1 – Data Sources

Country	Form	Frequency	Data Availability	Distinction for Maturity	Form and Valuation	Coverage	Source
India	Perc	Qrt	03/2007 - 12/2012	Total marketable debt	Stocks, nominal value	Federal Government	Reserve Bank of India. Database on Indian Economy. Statistics. Financial Market. Government Securities Market. Ownership Pattern of Government of India Dated Securities
Indonesia	Abs	Mth	05/1999 - 03/2013	Total marketable debt	Stocks, market value	Central Government	1. Bank of Indonesia. Statistics. Indonesian Financial Statistics. Government Finance Sector. Outstanding of Government Securities 2. Directorate General of Debt Management. Statistics. Ownership of Tradeable Government Securities
Malaysia	Abs	Qrt	03/1996 - 03/2013	Bills and bonds	N/A	N/A	Central Bank of Malaysia. Publications & Research Paper. Periodicals. Monthly Statistical Bulletin. Table 3.1.5 Federal Government Domestic Debt: Classification by Holder
South Korea	Abs	Qrt	12/2002 - 09/2013	Aggregate	Stocks, nominal value		
Thailand	Abs	Mth	01/2003 - 04/2013	Bills and bonds	Stocks, nominal value	Federal Government	I. Bank of Thailand. Statistics. Financial Markets. Debt Securities - series from 2009 onwards II. Datastream based on Bank of Thailand
Bulgaria	Abs	Qrt	06/2002 - 03/2012	Total marketable debt	Stocks, nominal value	Central Government	Bulgarian National Bank. Research and Publications. BNB Periodical Publications. Government Securities Market
Czech Republic	Abs	Mth	12/1996 - 03/2013	1. Bills and bonds 2. By maturity: T-bills to 50y bonds	Stocks, nominal value	Central Government	Ministry of Finance. State Debt. Debt Statistics. Treasury Securities by Type of Holder.

Hungary	Abs	Qrt	12/1997 - 12/2012	Bills and bonds	Stocks, N/A	Federal Government	I. Government Debt Management Agency. Publication, Statistics. Statistics. Ownership structure of government securities II. Hungarian Central Bank. Statistics. Statistical Data and Information. Statistical Time Series. Table XIII: Securities Data on securities issued by Hungarian residents with breakdown by issuer and holding sectors
Israel	Perc	Mth	01/2006 - 12/2012	Bills and bonds	Stocks, nominal value	Central Government	Bank of Israel. Publications. Annual Reports. Bank of Israel Annual Report - by year
Latvia	Abs	Mth	07/1996 - 12/2009	Bills and bonds	Stocks, nominal value	Central Government	Courtesy of the Monetary Policy Department of the Bank of Latvia
Poland	Abs	Mth	01/1996 - 06/2013	1. Bills and bonds 2. By instrument, i.e. year of maturity	Stocks, market value	Central Government	Ministry of Finance. Public Debt. Publications. 1) Investors. Secondary Market. Nominal T-bonds and T-bills outstanding 2) State Treasury Debt
Romania	Abs	Qrt	09/2010 - 06/2014				
South Africa	Abs	Mth	01/2006 - 06/2011	Bills, short-term bonds, long-term bonds	Stocks, market value	Central Government	Reserve Bank of South Africa. Publications. Publications and Noties. Statistical Tables. Ownership distribution of domestic marketable debt.
Turkey	Abs	Mth	01/2006 - 05/2013	Total marketable debt	Stocks, nominal value	Central Government	Republic of Turkey Prime Ministry Undersecretariat of Treasury. Statistics. Public Finance. Central Government Domestic Debt Statistics. Composition of Domestic Debt Stock by Holders.
Brazil	Abs	Mth	01/2007 - 05/2013	Total marketable debt	Stocks, nominal value	Central Government	I. Tesouro Nacional. Public Debt. Federal Public Debt Monthly Report.

Chile			03/2010 - 09/2013				
Colombia			03/2010 - 12/2013				
Mexico	Abs	Mth	01/1999 - 06/2013	Bills and bonds	Stocks, nominal value	Central Government	Banco de Mexico. Statistics. 1) Financial system. Financial markets. Debt outstanding. 2) Public Finances. Average Maturity of Government Securities.
Peru	Abs	Mth	11/2003 - 11/2011	By instrument, i.e. year of maturity	Stocks, nominal value	Central Government	Courtesy of Dirección General de Endeudamiento y Tesoro Público de la República del Perú

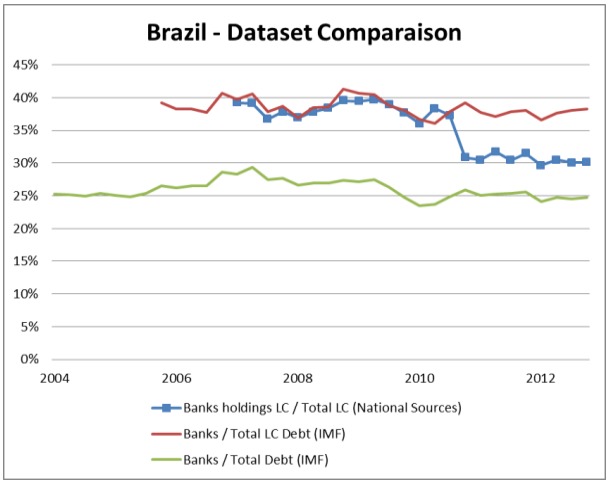
Table 3: Comparison of Relative Holdings Data based on Datasets constructed using National Sources vs. International Databases (IMF)

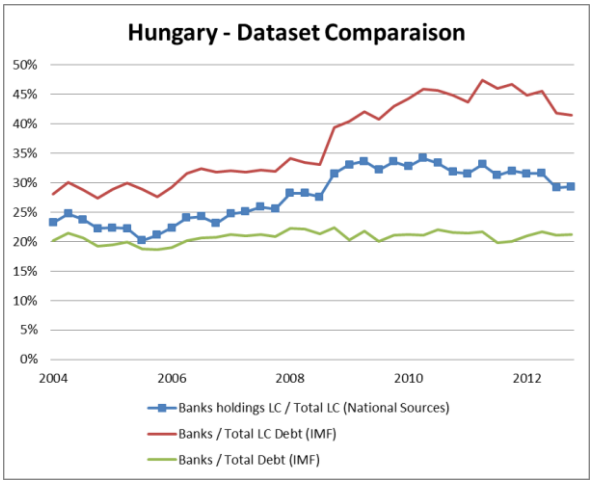
Country	Difference in Share of Foreign Holders LC	Difference in Share of Bank Holders LC	Difference in Share of CB Holders LC
Brazil	0%	-3%	n/a
Bulgaria	1%	-78%	n/a
Czech Republic	n/a	n/a	n/a
Hungary	-1%	-9%	-1%
India	0%	-15%	0%
Indonesia	0%	-5%	-50%
Israel	n/a	n/a	n/a
Korea	n/a	n/a	n/a
Latvia	-33%	-31%	0%
Malaysia	3%	-9%	0%
Mexico	0%	-4%	n/a
Peru	0%	-50%	n/a
Poland	0%	-14%	0%
South Africa	n/a	-9%	-1%
Thailand	1%	-4%	1%
Turkey	0%	-21%	-1%
Total Average	**0%**	**-17%**	**-7%**

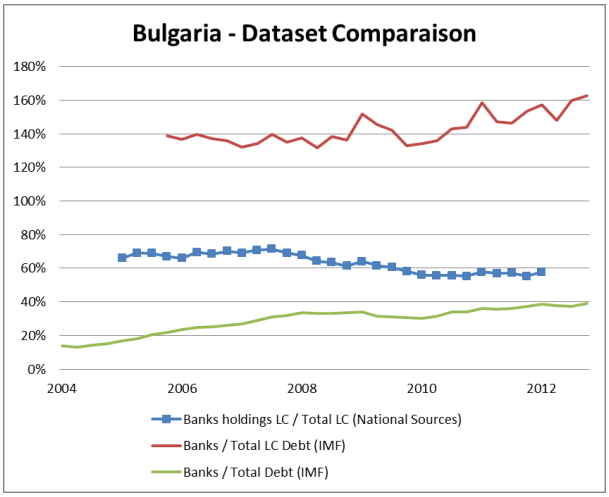
Note: fields marked in light orange represent deviation above 10% between two datasets.

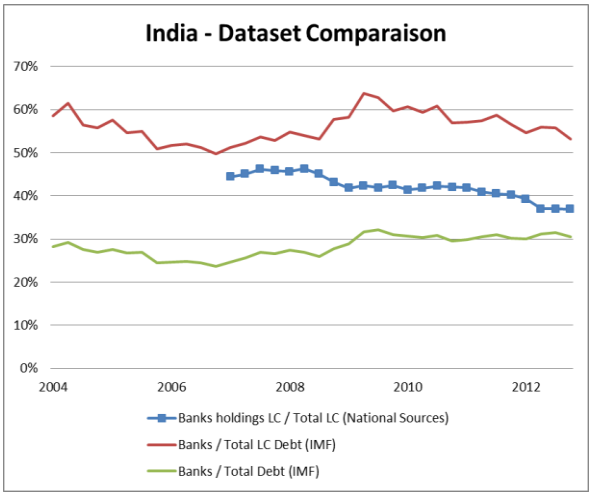
Appendix Figures

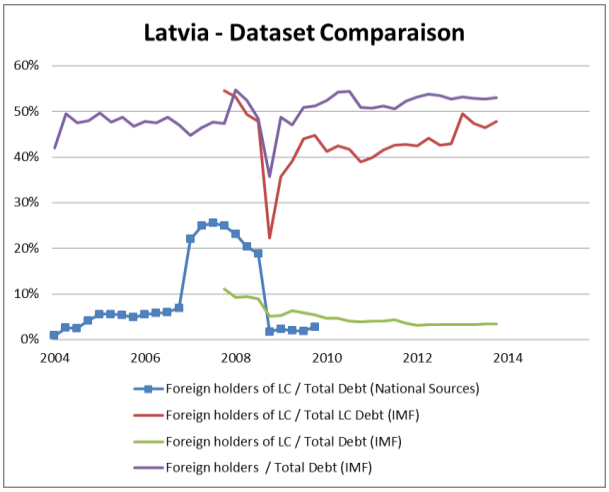
Graphs below represent countries and investor types where the holdings diverge significantly.

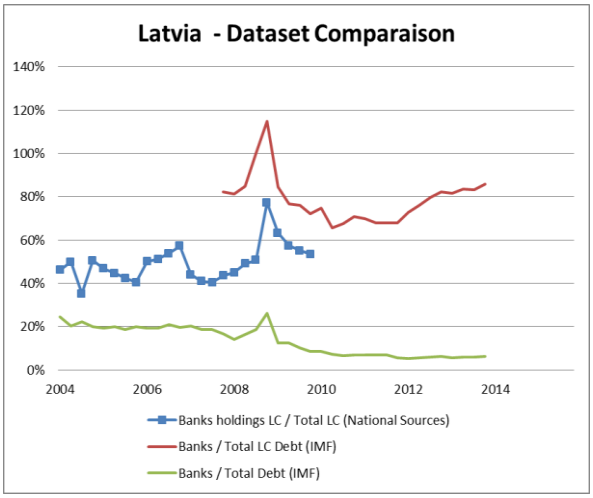


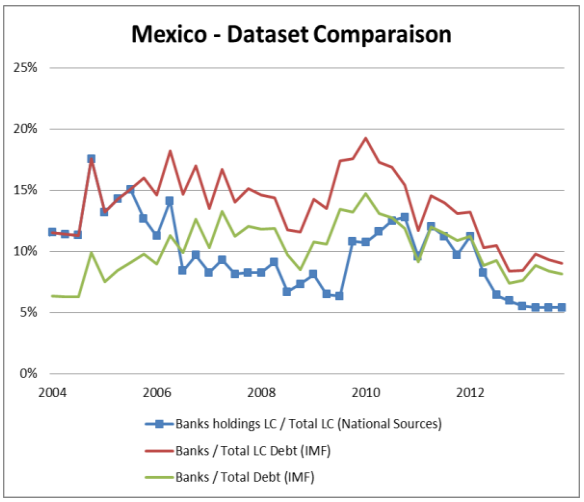


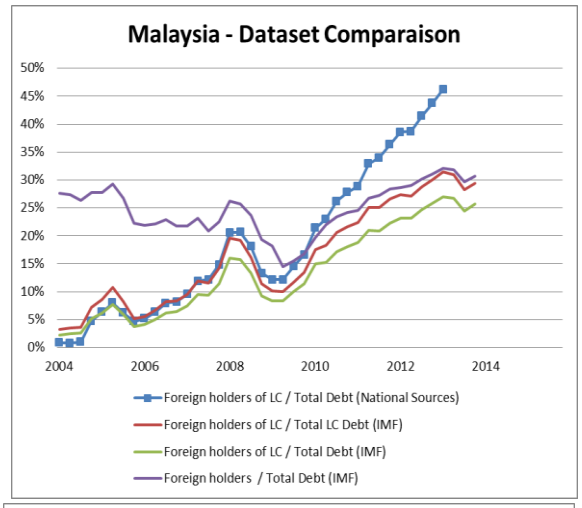


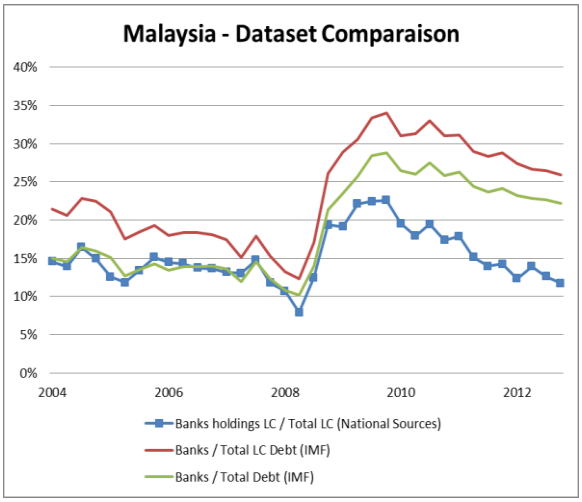







Mexico - Dataset Comparaison
25%
20%
15%
10%
5%
0%
2004
2006
2008
2010
2012
Banks holdings LC / Total LC (National Sources)
Banks / Total LC Debt (IMF)
Banks / Total Debt (IMF)


Malaysia - Dataset Comparaison
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
2004
2006
2008
2010
2012
2014
Foreign holders of LC / Total Debt (National Sources)
Foreign holders of LC / Total LC Debt (IMF)
Foreign holders of LC / Total Debt (IMF)
Foreign holders / Total Debt (IMF)


Malaysia - Dataset Comparaison
40%
35%
30%
25%
20%
15%
10%
5%
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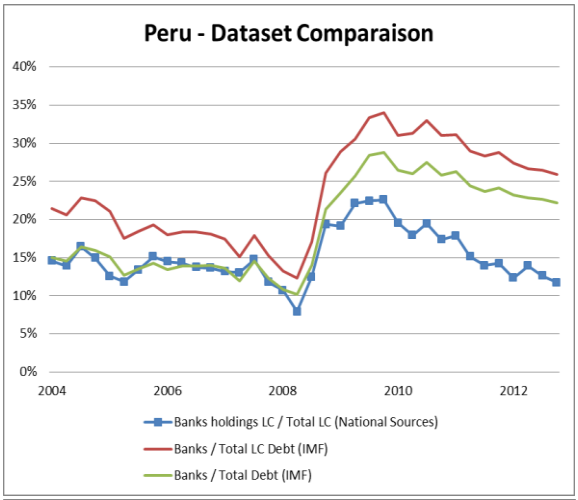
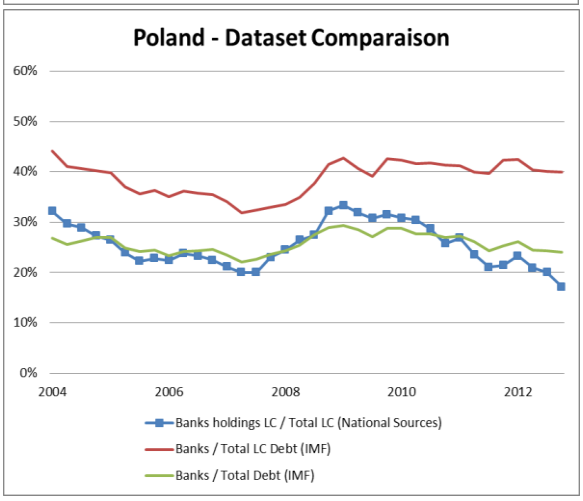
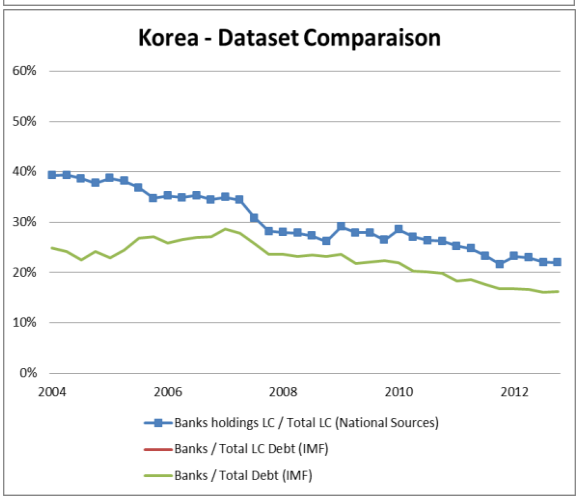
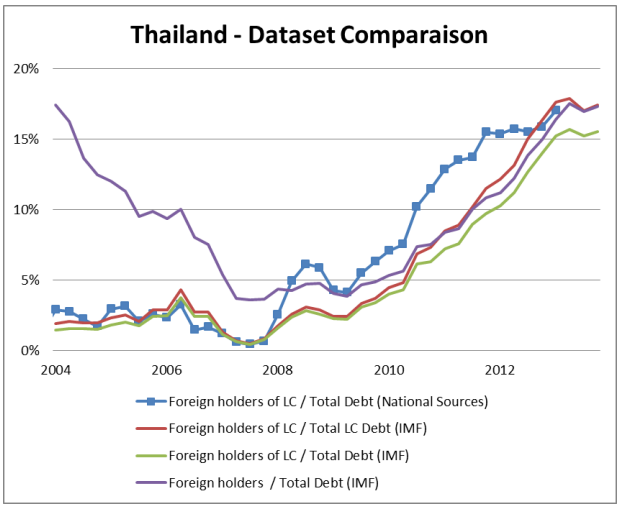
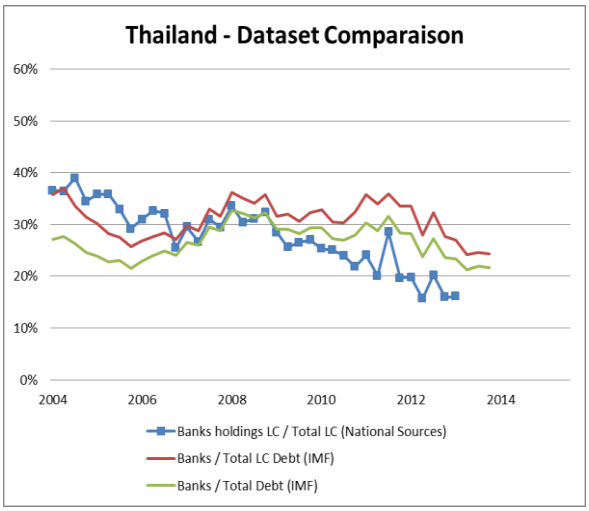
2004
2006
2008
2010
2012
Banks holdings LC / Total LC (National Sources)
Banks / Total LC Debt (IMF)
Banks / Total Debt (IMF)


Peru - Dataset Comparaison
40%
35%
30%
25%
20%
15%
10%
5%
0%
2004
2006
2008
2010
2012
Banks holdings LC / Total LC (National Sources)
Banks / Total LC Debt (IMF)
Banks / Total Debt (IMF)


Poland - Dataset Comparaison
60%
50%
40%
30%
20%
10%
0%
2004
2006
2008
2010
2012
Banks holdings LC / Total LC (National Sources)
Banks / Total LC Debt (IMF)
Banks / Total Debt (IMF)


Korea - Dataset Comparaison
60%
50%
40%
30%
20%
10%
0%
2004
2006
2008
2010
2012
Banks holdings LC / Total LC (National Sources)
Banks / Total LC Debt (IMF)
Banks / Total Debt (IMF)


Thailand - Dataset Comparaison
20%
15%
10%
5%
0%
2004
2006
2008
2010
2012
Foreign holders of LC / Total Debt (National Sources)
Foreign holders of LC / Total LC Debt (IMF)
Foreign holders of LC / Total Debt (IMF)
Foreign holders / Total Debt (IMF)


Thailand - Dataset Comparaison
60%
50%
40%
30%
20%
10%
0%
2004
2006
2008
2010
2012
2014
Banks holdings LC / Total LC (National Sources)
Banks / Total LC Debt (IMF)
Banks / Total Debt (IMF)

CONCLUSION GÉNÉRALE

To date empirical academic research on government debt focused predominately on bond prices, default risk and crisis episodes. The research contribution of this thesis is threefold. First, it sheds new light on the underlying dynamics of debt by introducing a new dataset on investor holdings of government debt in developed and emerging economies. Second, it applies econometric analysis to understand both the drivers and financial implications of changes investors' demand for government bonds. Third, it identifies the drivers of development of local currency bond markets in emerging economies and shows how foreign participation in local currency bond markets can affect sensitivity of bonds to risk factors. The contribution of each of the four articles is summarized as follows.

Building on a new broad dataset, the first article introduces the bondholdings dataset and aims to explain what factors drive demand for government bonds among different investor groups, namely private and official non-residents, domestic banks, domestic pension funds and insurance companies and domestic investment and mutual funds. Descriptive statistics show that the state and dynamics of the investor structure varies strongly across countries with Eurozone debt being held mostly externally, bonds of US, UK and Japan held predominately by domestic agents, whereas the share of foreign investors holding emerging market debt has been consistently rising and reached record levels in May of 2013. Econometric results show that in most countries demand from foreign private investors, non-domestic central banks and domestic banks is relatively disconnected from macroeconomic variables and driven mainly by yields, fiscal situation, global market sentiment and policy uncertainty. Econometric findings indicate that prior to the crisis that international private investors, banks and investment funds behaved as return seekers that purchase government bonds when bond prices increase. Not surprisingly, perception of credit risk by international investors evolved over time. Prior to the crisis private international investors were purchasing bonds of countries with higher growth, rising public indebtedness and higher yields. However, from 2007 onwards international private flows were directed to countries with lower yields. As a result, private inflows are significantly associated with falling sovereign yields in some countries while outflows are associated with increasing yields in others. As for foreign central banks, they tend to purchase bonds with low yields and better credit ratings, and sell when

under rising spreads or rating downgrades. Last but not least, econometric findings on relationship between investor demand and yields indicate that greater foreign demand for local currency government debt tends to significantly lower sovereign bond yields in Peripheral Eurozone and Emerging Economies; the latter result is further investigated in Article 4. In terms of potential research extensions, one could focus on cross-country linkages between different investor groups in countries with different degree of financial integration, for instance impact of the change in Eurozone crisis on foreign holdings in emerging market economies. In general, the policy and investment implications of these research results indicate that the investor base is a highly relevant element of the financial architecture that requires data standardization, better data accessibility and above all consistent monitoring by the authorities and investors.

The second article investigates empirically the impact of rating upgrades and downgrades on the dynamics of the investor structure and bond yields. Econometric analysis is conducted on a broad and heterogeneous panel of countries under consideration for different country types and rating agencies, anticipative effects related to rating outlooks, and general vs. serial rating changes vs. multi-notch rating changes. Findings for the full sample indicate that upgrades exert no consistent and significant impact neither on investor holdings nor on bond yields, no matter whether they are preceded by an outlook warning or not. In contrast, results on the full sample of countries indicate that sovereign yields and all types of domestic investors are affected by rating downgrades, in particular those preceded by negative outlooks. In case of Eurozone Periphery and Emerging Economies, foreign private investors and sovereign yields were influenced in particular by the second and third downgrades over two-year horizon. Downgrades by S&P and Moody's in Peripheral Eurozone were associated not only with significant changes in holdings among non-resident private investors and non-resident central banks, but also with intensification of yield volatility. In Emerging Economies, downgrades by Fitch affected the holdings of foreign investors, domestic banks and pension funds, and sovereign bonds. Last but not least, investors in Emerging Economies reacted differently to 1st and 3rd downgrades over a two year horizon and to multi-notch downgrades. Presented results convey meaningful policy and investment implications. First, rating changes not only affect the bond yields, but more importantly they change the structure of investor holdings. Even though at this stage of research the holdings-yields relationship has not been entirely identified, further research should investigate whether a change in investor structure following rating change may permanently affect the level and volatility of bond yields and, in consequence, overall debt sustainability in the long run.

The third article analyses how fundamental and political indicators embedded in the sovereign risk determine the local currency yields and foreign currency yields of bonds issued by the same government. The novelty of our approach consists in comparing local currency bonds with foreign currency bonds using a broad dataset of individual bonds for developed and emerging countries in combination with data for the currency structure of government debt and foreign participation in local currency debt. To provide a complete picture we investigate separately the unhedged LC yields, FC yields and the spread between FX-hedged LC yields and FC yields. Empirical findings can be attributed into three groups. First, in general LC yields react more to local risk factors than FC yields and the reactivity increases when the share of LC debt to total debt or foreign participation in LC debt increase. Second, Econometric results for all countries indicate that the spread between FC yield and FX-hedged LC Yield is significantly and positively related to credit ratings and political risk. Interestingly, both rising inflation and debt to GDP significantly increase the FC hedged-LC spread for emerging economies, but decrease the spread for advanced economies. Third, in emerging countries with high share of LC debt and high share of foreign participation, the estimated coefficients for political risk, inflation, credit rating and current account are significant and considerably stronger than for the full sample. Interestingly, under high foreign participation and high share of LC debt, the coefficients are also stronger for LC yield than for FC yield. These findings suggest also that higher foreign participation renders LC government bonds more vulnerable to local risk factors. The empirical results are relevant for policymakers, investors and governments issuing foreign currency debt. Policy makers need to take into account that countries with low foreign debt, but high foreign participation in LC debt are more vulnerable to political and macroeconomic risk factors.

Following rather infamous history of sovereign and currency crisis, between 1996 and 2013 foreign investor participation in local currency debt markets in emerging economies increased from 5% to 21% on average. The objective of the fourth study is to determine empirically what factors shape the development of the domestic bond markets in emerging markets on one hand and what attracts foreign investors on the other. Empirical results show that foreign demand is a key driver of the growth of local currency debt in emerging markets, and that the main culprit of that increased demand is the low interest rate environment brought about by the Federal Reserve's unconventional monetary policy. The second motive of foreign currency participation is speculative, as FX interventions of central banks in emerging economies tend to attract foreign investors. While growth and inflation forecasts remain

important indicators for both the development of local currency debt market and foreign participation therein, we find that institutional factors like political risk, bondholder protection or central bank independence play a very limited role in both processes. After nearly a decade of zero interest rate policy in the US and other advanced economies, the incertitude about investors' behavior remains a night breaking dilemma for issuing governments, policymakers and investors. Our results call for close monitoring of foreign investors' behavior during the period of interest rate normalization in advanced economies.

This thesis sheds new light on the structure and dynamics of the investor base and the presented data and findings constitute a solid starting point for further research on both theoretical and empirical grounds.